JAN 2 192
WM. R. STANS
CL

Supreme Court of the United States

OCTOBER TERM, 1922.

No. 178.

EIBEL PROCESS COMPANY,
Plaintiff-Petitioner,

vs.

MINNESOTA & ONTARIO PAPER COMPANY,
Defendant-Respondent.

BRIEF FOR DEFENDANT-RESPONDENT

NATHAN HEARD,
RICHARD PAUL,
MAURICE M. MOORE,
Of Counsel.

AMASA C. PAUL,
LIVINGSTON GIFFORD,
For Defendant-Respondent.

Hayward Brief Company, 513 Fourth Ave. So., Minneapolis

INDEX.

Page.

Statement of the Case 1

I. Alleged Eibel Invention 3
Alleges Invention Consists Merely in Increasing Pitch of Old Fourdrinier Machine 3
Plaintiff's Expert Admits Only Question Involved is Question of Degree 4
Mere Difference in Degree is Not Patentable 6
Eibel Patent Does Set Up "A Critical Point" 10

II. Principal Questions at Issue 12
General Features of Fourdrinier Machines 12
Operation of These Features of the Machine 13
In Every Fourdrinier Machine Stock Must be Brought to Speed Equality With Wire 14
Usual Point of Speed Equality 14
Difference Between Speed of Wire and Initial Speed of Stock 15
Plaintiff's Expert Assumes Only Low Initial Speed Can be Employed 16
Factors That May be Employed to Bring About Speed Equality Between Stock and Wire 17
Gravity Feed Produced by High Head and Low Pitch or Low Head and High Pitch 20
Speeds Produced by Different Relations of Pitch and Head 20
No Infringement of Eibel Patent, etc. 22
Defendant's Machines do Not Infringe 23
Other Contentions of the Defendant-Appellant in this Case 26
Actual Difference in Acceleration of Stock Produced by a Three-Inch Pitch and a Five-Inch Pitch 28
Provision for Three-Inch Pitches on Prior Art Machines Admitted in Plaintiff's Brief 30
The Alleged Eibel Invention 31
Question of Patentable Invention Involved 31
Unimportant Whether Elevation Shown in Prior Art Machines is 2, 3 or 4 Inches 31
In Last Analysis Question of Invention Involved is Very Simple 33
Immaterial Whether Prior Users Had Same Purpose in Mind 35
Prior Art Machines Increased Gravity Feed by Higher Head 35

III. Detailed Examination of Patent in Suit 38
The Theory of the Eibel Patent 38
The Eibel "Principle" 39
The Eibel Specification 42
Carter Points Out Gist of Eibel Patent 46
Expert Livermore Agrees *With Carter That* Eibel Patent Requires Elimination of Drag of Wire..... 48
Plaintiff's Counsel on Former Argument Asserted Speed Equality Obtained by Pitch Alone 48
Same Interpretation Given to Eibel Patent in Remington-Martin Suit 51
Plaintiff's Expert Testified in Remington-Martin Suit Drag of Wire in Eibel Insignificant 51
Plaintiff's Expert Originally Testified in Eibel Installation Gravity Due to Pitch of Wire is Predominating Factor in Producing Speed Equality 54
The Claims of the Patent in Suit 55

IV. Eibel Patent Tested by Carter Diagrams 56
The Terms "Total Pitch" and "Net Pitch" 56
Eibel Principle Illustrated by Carter Diagrams Nos. 1 and 1-A, Sheet No. 1 57
Plaintiff's Criticism of Carter Diagrams 59
Theory of Eibel Patent Not Borne Out by Operation of Machine Illustrated 60
Increase of One Inch in Head Equal to Increase of Three Inches in Pitch 63

V. Evidence Respecting Operation of Defendant's Machines 65
The Operation of Defendant's Machines 65
Defendant's No. 2 Machine 67
District Court Did Not Pass on No. 2 Machine 68
Court of Appeals Holds Necessary to Determine Amount of Pitch Covered by Eibel Patent 70
Experts Carter and Livermore Agree That Defendant's Machines Do Not Employ the So-Called Eibel Principle 72
Plaintiff's Expert Originally Asserted Stock Accelerated to Speed of Wire, in Defendant's Machines, by Gravity Due to Pitch 74
Aldrich in Rebuttal Concedes Defendant's Position... 74
Under This Concession of Plaintiff's Expert, Defendant's Machines Do Not Employ Eibel Principle or Infringe Eibel Patent 75
Aldrich Thinks Pitch Gives Defendant's Machine Some Benefit 75

Aldrich Concedes Method of Computation Used by Defendant's Expert Correct 76
Plaintiff's Expert Contends Eibel Patent Employed if Any Acceleration Due to Pitch of Wire is Obtained.. 76
That Defendant Gets Some Benefit From Pitch Not Sufficient to Make Case of Infringement 77
Court of Appeals in This Case Holds Eibel Patent Requires Gravity Due to Pitch to Produce Equality of Speed Between Stock and Wire 78

VI. The Prior Art 83
The Barrett & Horne Patent 83
Bayless Austin Machine of 1902 90
Kimberly-Clark Machines of 1904 94
Niagara (Kimberly-Clark) Machines of 1904 97
Lisbon Falls Machines of 1902-1905 99
The Bagley & Sewall Machines of 1904 104
Lansing's Testimony Respecting Pitched Wires 108
Pejepscot Paper Mills 1906 110
Palmer's Falls Machines of 1898 111
King Machines 1901-1902 113
Northern Paper Mill 1904 114
Other Prior Art Machines 115
Increase in Speed of Machines Reviewed in "History of Paper Manufacturing" 116
Lansing's Review of the Development of Fourdrinier Machines 117
Applying Aldrich Test Eibel Patent Invalidated by Prior Art Machines 119
Eibel Patent Cannot be Differentiated to Merely Cover Degree of Pitch Not Before Used 119
Champion Paper Company Machine With Flat Wire, 1911 120

VII. Defendant's and Prior Art Machines Identical in Operation 122
No Difference in Operation Between Defendant's and Prior Art Machines 122
Testimony of Defendant's Expert Comparing Operation of Defendant's and Prior Art Machines Not Questioned 126

VIII. Opinion of District Court on Question of Invention and Infringement 128
District Court Found Invention in Difference of Degree 128
District Court Found Infringement in Defendant's Ma-

chines 1, 3 and 4 131
Decision of District Court Respecting Evidence of Prior Uses 135

IX. Opinion of Circuit Court of Appeals Directly Contrary to Finding of District Court 143
Circuit Court of Appeals Finds No Invention in Difference of Decree 143
Accidental Uses 145

X. Drainage and Speed 148
Pitch of Wire in Any Machine Serves Dual Purpose of Drainage and Speed 148
Plaintiff's Counsel Argue That Users of Prior Art Machines Had in Mind Only Drainage Effect, and Did Not Appreciate That Increase in Pitch Lessened Difference Between Speed of Stock and Speed of Wire.. 150

XI. The Alleged Process 155
Patent in Suit is Upon a Machine and Not a Process... 155

XII. Prior Decisions Upon Eibel Patent 160
The Remington-Martin Decision in the N. Y. Circuit Court of Appeals Depended Upon the Limitation That the Gravity Speed of the Stock Was "Approximately Equal" to the Speed of the Wire 160
Court of Appeals in Remington-Martin Suit Misled as to Prior Art Structures 164
Court of Appeals in Remington-Martin Suit Misled as to Speed of Prior Art Machines and as to Effect of Applying High Pitches to Such Machines 168
Judge Ray's Decision in Remington-Martin Suit 171
No Question of Infringement in Remington-Martin Case. 172
Decision of British High Court of Justice Upon Eibel Patent 173

XIII. Abandonment of High Pitch by Plaintiff's Licensee 176
Plaintiff's Licensee Has Abandoned High Pitch for Flat Wire With High Head 176

XIV. Plaintiff's Claim of Improved Results and Commercial Success 178
The Adoption of So-Called High Pitches 178
Evidence Respecting Increase of Speed 178

XV. Anticipation of Claims 7 and 8 186
These Claims Exactly Met by Northern Paper Mill Machine 186

XVI. Argument of Patentability Based on Use 189
Extent of Use Unsafe Criterion on Question of Patentability 189

XVII. Prior Patent Covering Defendant's Machines. 195
Defendant's Machine Built Under Savery Patent No. 742,239 Now Expired 195

XVIII. Plaintiff's Brief in This Court 197
Consideration of Certain of Plaintiff's Arguments.....197
Amount of Pitch Conceded by Plaintiff 198
Plaintiff Also Concedes 4-inch Pitches Public Property.200
Effect Would Not be Different if 3 Inches Were Highest Pitch of Prior Art 200
Plaintiff's Discussion of Prior Art 201
The Barrett & Horne Patent 201
Bayless-Austin Machines 202
Kimberly-Clark Machines 205
Lisbon Falls Machines 206
Bayless, Kimberly-Clark and Lisbon Falls Machines Still Running as They Were Prior to Eibel's Alleged Invention 207
The Bagley & Sewall Machines 207
Court of Appeals Found it Necessary to Review Prior Art Testimony 210
Various Claims Made by Plaintiff's Expert and Counsel.211
Plaintiff's Counsel Assert "Eibel Invented a New Machine" 214
Plaintiff Erroneously Alleges Effect of "Overrunning" in Prior Art Machines 215
Plaintiff's Counsel Quote Defendant's Witnesses as Agreeing That Pitch of Six Inches is Substantial...217
Claim in Plaintiff's Brief That Regular Practice Was to Run Wires Level or Even Up Hill 218
Remington-Martin Testimony Not Evidence in This Case 219
Plaintiff Concedes Principal Prior Uses Here Were Not Before Court in Remington-Martin Suit 220
Plaintiff's Authorities as to Indefiniteness of Claims...220
Plaintiff's Statement That 6-inch Pitch on No. 2 Machine Temporary Expedient 222
Statement in Defendant's Preliminary Injunction Brief.222
Plaintiff's Reference to the English Decision.....223
Present Fourdrinier Machine Result of General Evolution 224
Conclusion 226

TABLE OF CASES.

Advance Auto Acc. Co. v. Reflex Auto Acc. Co., 284 Fed. 117 . 194
American Tube Works v. Bridgewater Iron Co., 132 Fed. 16 . 159
Ansonia Brass & Copper Co. v. Electrical Sup. Co., 144 U. S. 11, 36 L. Ed. 327 . . . . . 87, 148
Barbed Wire Patent, 143 U. S. 275 9
Benjamin Co. v. Northwestern Co., 251 Fed. 288 192
Blake v. San Francisco, 113 U. S. 679, 28 L. Ed. 1070 . . . . 88, 148
Boston Elastic Fabrics Co. v. East Hampton Rubber Thread Co., 1st Holmes, 372, 3 Fed. Cas. No. 1676 158
Brenchaud v. Mutual Life Ins. Co., 166 Fed. 753 160
Brown v. Piper, 91 U. S. 37 147
Burr v. Duryea, 65 U. S. 531, 17 L. Ed. 657 157
Burt v. Evory, 133 U. S. 349 82
Carnegie Steel Co. v. Cambria, 185 U. S. 403 71
Chemical Rubber Co. v. Raymond, 71 Fed. 179 162
Codman v. Amia, 70 Fed. 710 89
Corning v. Burden, 15 How. 253 155
DeLamar v. DeLamar Min. Co., 117 Fed. 240 163
Eames v. Worcester Poly. Ins., 123 Fed. 67 82
Eibel Process Co. v. Remington-Martin Co., 226 Fed. 766 2
Estey v. Burdett, 109 U. S. 633 . . . . . 7, 8
European Eibel Co. Ld. v. The Edward Lloyd Co. Ld., Reported in Illustrated Official Journal Sup. June 21, 1911, p. 349 . . . . . 1, 81, 173
Fox v. Perkins, 52 Fed. 205 82
French v. Carter, 137 U. S. 239 7
Fullerton v. Anderson, 166 Fed. 443 163
Galvin v. City of Grand Rapids, 53 C. C. A. 165, 115 Fed. 511 82
General Electric Co. v. Ohio Brass Co., 277 Fed. 917 7
Glue Co. v. Upton, 97 U. S. 3 7
Gordon v. Worder, 150 U. S. 47 119
Grant v. Walter, 148 U. S. 547 82
Grinnell Washing Mach. Co. v. Johnson, 247 U. S. 426 193
Guidet v. Brooklyn, 105 U. S. 550 . . . . . 6, 8
Harvey Hubbel Inc. v. General Electric Co., 267 Fed. 564 . . . 192
Knapp v. Morss, 150 U. S. 221 119
Magowan v. Belting Co., 141 U. S. 332 191
Market St. Ry. Co. v. Rowley, 155 U. S. 621 82
Merrill v. Yoemans, 94 U. S. 568 82
Minerals Separation Co. v. Hyde, 242 U. S. 271 9
McClain v. Ortmayer, 141 U. S. 419, 35 L. Ed. 800 . . . . . 82, 191
National Carpet Sweeper Co. v. Bissell Carpet Sweeper Co., 249 Fed. 196 191
National Machine Corp. v. Bental Co., 241 Fed. 72 192

Neptune Meter Co. v. National Meter Co., 127 Fed. 573 163
New York Scaffolding Co. v. Liebel-Binney Co. 193
Penn. Ry. Co. v. Truck Co., 110 U. S. 490, 28 L. Ed. 232..88, 148
Peters v. Active Mfg. Co., 129 U. S. 530 119
Risdon Iron Works v. Medart, 158 U. S. 68 147
Scaffolding Co. v. Chain Belt Co., 254 U. S. 32 .....86, 147, 157
Smith v. Nichols, 21 Wall. 112 82
Solva v. Perkins, 251 Fed. 64 163
Spirella Co. v. Nubone Corset Co., 216 Fed. 898..... 8
Stanley Co. v. Twisted Wire Co., 256 Fed. 101 192
Stow v. Chicago, 104 U. S. 517 88
Thatcher Heating Co. v. Burtis, 121 U. S. 286 119
Tilghman v. Proctor, 102 U. S. 707, 26 L. Ed. 279 146
Torry v. Hancock, 184 Fed. 61 7
Vacuum Cleaner Co. v. A. Rot. Valve Co., 227 Fed. 998..... 71
Westinghouse v. Boyden Power Brake Co., 170 U. S. 537....147
Wise Soda App. Co. v. Bishop-Babcock-Becker Co., 240 Fed. 743 8
Wood v. Underhill, 5 How. 1 163
Wright & Colton Wire Cloth Co. v. Clinton Wire Cloth Co., 67 Fed. 792 89

Supreme Court of the United States

OCTOBER TERM, 1922.

No. 178.

EIBEL PROCESS COMPANY,

Plaintiff-Petitioner,

vs.

MINNESOTA & ONTARIO PAPER COMPANY,

Defendant-Respondent.

BRIEF FOR DEFENDANT-RESPONDENT

STATEMENT OF THE CASE.

This is a suit for infringement of Letters Patent of the United States to William Eibel No. 845,224, issued February 26th, 1907, for an Improvement in Fourdrinier Machines for Making Paper.

A corresponding British patent was held invalid by the British High Court of Justice, Chancery Division, in *European Eibel Co., Ltd. v. Edward Lloyd, Ltd.*, reported in the Illustrated Official Journal (patents) Supplement, June 21, 1911, page 349. A copy of this decision will be found at the back of this brief.

The bill of complaint in this suit was filed in the District Court for the District of Maine on January 1st, 1917. On March 29th, 1917, on plaintiff's motion an order for a preliminary injunction was signed and filed. Upon appeal by defendant the Circuit Court of Appeals (Judges Dodge, Bingham and Aldrich), on April 27th, 1917, modified the preliminary

injunction so as to permit the defendant to continue the operation and use, at its place of business at International Falls, Minnesota, of its four Fourdrinier machines until final determination of the cause on the question of validity and infringement (Rec., pp. 6-8).

By stipulation of the parties the testimony was taken by deposition, and the case came on for hearing on September 13th, 1920, before District Judge Hale, and was argued and submitted on that date. An opinion sustaining the Eibel patent and holding it infringed was filed by Judge Hale on September 30th, 1920 (267 Fed. p. 847).

An interlocutory degree was entered pursuant to this order on November 24th, 1920. Defendant having appealed to the Circuit Court of Appeals for the First Circuit, a decision by that court rendered on June 29th, 1921 (Judges Bingham, Johnson and Anderson), directed the dismissal of the bill. In the opinion, by Judge Anderson, it is said:

"Summarizing our conclusions: If we construe the language of the patent according to its natural import as claiming pitch sufficient to eliminate drag, there was no useful invention, and no infringement even if there was invention; if we construe the claims as plaintiff would have them construed, they cover merely a degree, and are void for indefiniteness."

The patent in suit as to claims 1, 2, 3, 7, 8 and 12, was held void for prior public use by District Judge Ray in *Eibel Process Co. v. Remington-Martin Co.*, 226 Fed. 766. The Circuit Court of Appeals for the Second Circuit reversed the decree of the District Court as to claims 1, 2 and 3 of the patent in suit, and found it unnecessary to pass upon claims 7, 8 and 12 (234 Fed. 624). The principal prior art patent relied upon by defendant herein (*Barrett & Horne*, No. 691,333), was not before the courts in the Remington-Martin suit, nor were the Bayless-Austin, the Kimberly-Clark, the Lisbon Falls, the Pejepscot or the Bagley & Sewall machines, all prior uses, which defendant contends show anticipation of the alleged invention of the patent

in suit, if such patent is construed as having sufficient scope to include any of defendant's machines. This was so held by the Court of Appeals in this case.

In this brief we refer to Petitioner as "Plaintiff" and to the Respondent as "Defendant."

I.

ALLEGED EIBEL INVENTION.

Alleged Invention Consists Merely in Increasing Pitch of Old Fourdrinier Machine.

While the patent is entitled "An Improvement in Fourdrinier Machines," the alleged invention as construed by plaintiff, consists merely in elevating, by suitable screws or by blocks under its forward legs, the breast-roll, or stock-receiving, end of the machine so as to give what the patent calls a "substantial" pitch to the making wire.

It is conceded that it was old to elevate the receiving or breast-roll end of such a machine 3, 3½, 4 and perhaps 5 inches, so as to give a corresponding pitch to the screen or making wire. Plaintiff claims, however, that because a pitch of 3 or 4, perhaps 5 inches had been used before Eibel such a pitch is to be regarded as "trivial," and not within the terms of the Eibel patent. Plaintiff asserts, however, that pitches of from 5 inches up had not been used before Eibel, and while conceding that there is no difference, except a difference of degree, between the concededly old pitches of 3 or 4 inches, and the pitches of 5 inches up, which plaintiff claims were first used by Eibel, plaintiff asserts that these latter pitches are "substantial" and novel, and that no one should be permitted to use these higher pitches—from 5 inches up—without a license from Eibel's assignee, the plaintiff, Eibel Process Company.

Plaintiff's proposition, in substance, amounts to asserting that while pitches of 3 and 4 inches were old and known in the

art, no one before Eibel had thought of using a pitch of 5 inches or more, and even though there is no difference between a 5-inch pitch and a 3-inch pitch except a difference in degree, plaintiff's patent should be held valid and construed to cover all pitches of 5 inches or more, because when Eibel introduced the higher pitches, the same went into extensive use. Plaintiff would sustain a patent upon a mere difference in degree of pitch because the greater degree of pitch permitted the machine to be run at a greater speed.

PLAINTIFF'S EXPERT ADMITS ONLY QUESTION INVOLVED IS QUESTION OF DEGREE.

That the only difference between a Fourdrinier machine blocked up at its stock-receiving end, 5 inches or more, which is the only change in the machine Eibel professes to have made, thereby giving the screen or making wire what is called a "substantial" pitch, and prior art machines of identical construction, but with 3 or 3½ or 4-inch blocks beneath the forward end of the machine, thereby inclining the screen or making wire in exactly the same way as is done with the 5-inch or greater blocks, the incline being of less degree, is expressly admitted by plaintiff's expert in the testimony in the record, which we quote as follows:

"XQ44. Then you do not know whether the advantages of the so-called Eibel invention would be obtained if a machine were used with less than a 9-inch pitch?

A. Yes, I do, because I can tell about how much acceleration can be expected with lesser pitches. Other conditions being right, a smaller pitch than nine inches can constitute the Eibel invention as well as nine inches or above.

XQ45. How small?

A. I should say 6 inches might be the Eibel invention.

XQ46. Is 6 inches the limit?

A. I would not say that less than five inches would constitute the Eibel invention, because *something approximating that has been shown to be in use previously*, but for the different purpose of drainage.

I hardly think that four inches could be considered as a substantial pitch.

XQ134. Why not?

A. Because Eibel in his specifications attempts to differentiate the pitch that he has in mind from what had been previously used when he specifies that it is to be substantial (Rec., p. 53).

XQ54. You would have an acceleration of the stock as it traveled down the wire with the 5-inch pitch, would you not?

A. Certainly. You would have it with a 2-inch pitch also.

XQ55. And the difference in the acceleration with a 5-inch pitch and a 6-inch pitch would be merely one of degree, would it not?

A. Yes.

XQ56. And that would be true, also, of a 2-inch pitch and a 6-inch pitch?

A. Gravity would certainly act the same with a 1 or 2-inch pitch as with a 6-inch pitch (Rec., pp. 42-43).

XQ223. And, as I understand you, referring to claim 1 of the Eibel patent, 'a substantial elevation above the level' for the paper making wire means an elevation of five inches or more?

A. Yes (Rec., p. 68).

XQ161. Now, you have stated, I think, that a machine having a 5-inch pitch would be about on a border line of the Eibel invention, have you not?

A. Yes, sir (Rec., p. 58).

XQ224. And the speed of the stock is recited in the claims—what must that be to comply with the requirements that the 'stock shall travel by gravity rapidly'?

A. Why, a rapid travel would necessarily be the result of a substantial or high head.

XQ225. You mean a high head or a high pitch to the wire?

A. I meant to say a high pitch; a high or substantial pitch.

XQ226. Then it might be any speed that would be produced by a pitch of five inches or more?

A. I should say so.

XQ227. And that might be as low as 350 ft. per minute, might it not, depending upon the initial velocity with which the stock entered upon the wire?

A. I don't think it is to be thought of in connection with the head at all.

XQ230. And it would still embody the Eibel principle?

A. If it had no head, yes. In other words the Eibel invention can be employed without any head at all" (Rec., pp. 68-69).

It will be seen from the foregoing, quoted from the testi-

mony of plaintiff's expert, that it is freely conceded that pitches of 3 or 4 inches, for the screens or making wires of Fourdrinier machines, were old in the art prior to Eibel, and that with such pitches gravity acted exactly the same in accelerating the speed of the stock as it does with a pitch of 5 inches or more, asserted to constitute the Eibel invention.

MERE DIFFERENCE IN DEGREE IS NOT PATENTABLE.

Under many decisions of this court, a mere difference in degree is not patentable. In order to involve patentability there must be a "critical point" at which a departure occurs in the principle or mode of operation. In the Eibel patent in suit there is no such critical point, as the patent is construed in the testimony of plaintiff's expert; the mode of operation is the same in principle whether the pitch be 3, 4, 5, 6 or more inches. Therefore, the variations in pitch are mere variations of degree, and not patentable under numerous decisions of this court. We may refer to a few of the numerous decisions in this court in which there was no critical point, defining a departure between the old and the new, and in which the patents involved were held to be invalid:

In *Guidet v. Brooklyn*, 105 U. S. 550, the patentee undoubtedly taught the art the advantage of greater roughness on the sides of paving stones in contact with each other. The Supreme Court states (p. 552) as to the prior art:

"The side surfaces were comparatively smoother than his, though to some extent they were rough. * * * The effect of his specification and claim is, that if blocks are selected with their sides rough enough joints can be made that will furnish a suitable foothold without the use of strips, and without chamfering. * * * What he did was to show that if stone were used with rougher side surfaces than those found in the old pavements, all artificial means of keeping the transverse joints open might be abandoned, and the requisite surface secured. This was simply carrying forward the old idea, and doing what had been done before in substantially the same way, but with

better results. The change was only in degree, and consequently not patentable."

In *Estey v. Burdett*, 109 U. S. 633, the patentee taught the art that it was advantageous to contract the valve openings in the reed-board and organ more than they had theretofore been contracted, and that thereby the musical effect was very much improved; but the Supreme Court held that this variation in degree of contraction was not patentable (p. 640).

In *Glue Co. v. Upton*, 97 U. S. 3, the patentee taught the art the advantage of comminuting glue; or, in other words, "increasing its fragmentary division," but the Supreme Court held this unpatentable (p. 6).

In *French v. Carter*, 137 U. S. 239, the patentee taught the art the advantage of increasing the width of the cap-stone of a vault roof, but the Supreme Court held this difference in degree unpatentable.

In *Torry v. Hancock*, 184 Fed. 61, 68, the Circuit Court of Appeals for the Eighth Circuit held that the "degree of inclination" of the disc of a plow "cannot be the subject of invention;" that the inclination "could be determined by a mechanic skilled in the art of making plows without any difficulty," and that this fact was to be "taken in connection with the fact that the prior art in the same or similar combinations had shown *some inclination* of the cutting portion of the disc, or of the disc itself" (citing *Eddy v. Dennis*, 95 U. S. 560).

In *General Electric Co. v. Ohio Brass Co.*, 277 Fed. 917, 924, it was said by the Circuit Court of Appeals for the Third Circuit that "We fail to discern invention in the mere adaptation of this * * * system of low potential to the complainant's system of high potential." Referring to the system of low potential, in the prior art, it said:

"Yet its problems, electrical and mechanical, were different only in degree from those in a system of high potential."

(See also *Spirella Co. v. Nubone Corset Co.*, C. C. A., Third Circuit, 216 Fed. 898, and *Wise Soda Apparatus Co. v. Bishop-Babcock & Becker Co.*, C. C. A., Sixth Circuit, 240 Fed. 743.)

Cases to the same effect might be cited indefinitely, in all of which a difference in degree was held unpatentable, notwithstanding the fact that the art had profited by the teaching of the patentee.

In this connection the decision of Judge Ray of the District Court in the Remington-Martin suit is of interest. In reference to the uncertainty and indefiniteness of the claims Judge Ray said:

"I have not deemed it necessary to discuss the indefiniteness and uncertainty of the claim in using the words 'substantial elevation' and the words 'whereby the stock is caused to travel by gravity *rapidly*.' What does 'substantial' mean, and what rate of speed is 'rapidly'? May we say that the two, four and six inches elevation of the prior art was not a 'substantial elevation,' or a 'high elevation'? May we say that with such an elevation of the breast-roll end of the wire the stock discharged thereon would not move 'rapidly in the direction of the movement of the wire'? And what is 'high elevation' in such a machine? How is it to be determined in view of the conceded prior art, the conceded prior uses and elevation of the wire, when and where infringement begins? It seems to me that the claims and specifications of a patent for an *improvement* in a Fourdrinier machine should be sufficiently definite, certain and specific to enable both the maker and user of such a machine, reasonably skilled in and acquainted with the art, to determine with reasonable certainty when he departs from the prior art and trenches on the 'high elevation' or the 'substantial' elevation of the patent, and when his stock and wire are moving 'rapidly' within the meaning of the patent for the improvement on the prior art. This is especially true when elevating the paper making wire in the prior art is conceded in the patent" (226 Fed. p. 773).

The distinction between mere matters of degree, such as the size of opening in *Estey v. Burdette*, and roughness of blocks in *Guidet v. Brooklyn*, and other cases where no patentability was found, and the few cases decided by this court in which

patentability has been found is expressed in the opinions of the court as due to the presence of a "critical" point.

In *Minerals Separation v. Hyde*, 242 U. S. 271, this court sustained claims 1, 2, 3, 5, 6, 7 and 12 because they particularly pointed out the degree or quantity of the oily liquid as "amounting to a fraction of one per cent on the ore," in some claims, and, in other claims, as "amounting to 0.02-0.5 per cent on the ore." Claims 9, 10 and 11 were held invalid because the amount of oil was designated as "a small quantity." The opinion states:

"While we thus find in favor of the validity of the patent, we cannot agree with the District Court in regarding it valid as to all of the claims in suit. As we have pointed out in this opinion there were many investigators at work in this field to which the process in suit relates when the patentees came into it, and it was while engaged in study of prior kindred processes that their discovery was made. While the evidence in the case makes it clear that they discovered the final step which converted experiment into solution, 'turned failure into success' (*The Barbed Wire Patent*, 143 U. S. 275), yet the investigations preceding were so informing that this final step was not a long one and the patent must be confined to the results obtained by the use of oil within the proportions often described in the testimony and in the claims of the patent as 'critical proportions' 'amounting to a fraction of one per cent on the ore,' and therefore the decree of this court will be that the patent is valid as to claims Nos. 1, 2, 3, 5, 6, 7 and 12, and that the defendant infringed these claims, but that it is invalid as to claims 9, 10 and 11."

The plaintiff thereupon entered a disclaimer with respect to claims 9, 10 and 11, which the Supreme Court subsequently held (250 U. S. 354) limited the "small quantity" of those claims to the same quantity specified in the claims sustained—namely, "a fraction of one per cent."

The gist of these two opinions of the Supreme Court in the *Minerals Separation* case is, that in cases involving differences of degree, the specification must set forth some "critical" degree which marks the point of transition from the processes

of the prior art to the process and discovery of the patent. In that case it was "a fraction of one per cent," and the claims which were not limited to this "critical" proportion, save by the vague expression "a small quantity," were held invalid, and nothing was held to infringe the patent save what was within the "critical" degree expressed in the patent.

Section 4888 of the statute requires that the specification and claims "Shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention." The words "high" and "substantial" in the Eibel patent do not "Particularly point out or distinctly claim" any range of pitch as distinguished from the 4 and 5-inch pitch of the prior art, and therefore the patent does not particularly point out and distinctly claim any range of pitch excepting that which it specifies as producing a gravity speed "approximately equal to the speed of the wire," as we more fully show below.

If the intent of the patent were to cover any range of pitches between 5 inches and 14 inches (as plaintiff's expert Aldrich supposes and testifies) it would have been necessary, for compliance with the statute, to state either in the specification or claims, or both, what that range was, so that the public on reading the patent could know the territory covered thereby. At present there is nothing in the patent to tell the public that it covers a 12-inch pitch any more than a 5-inch pitch, and plaintiff's expert places the lower range of pitch covered by the patent at 5 inches, not because this is a critical point where there is a change in principle of operation, but merely "*because something approximating that has been shown to be in use previously.*"

EIBEL PATENT DOES SET UP "A CRITICAL POINT."

A study of the Eibel patent in suit shows that the patentee was familiar with the rule of this court that we have stated

above, that in cases involving differences in degree from prior art structures or processes, there must be a critical point at which a departure occurs in the principle or mode of operation. Such a critical point the patentee clearly endeavored to set out in the specification of his patent and unquestionably it was because of this fact that the patent was allowed by the Patent Office. The critical point that the patentee Eibel sets up in his specification and claims is that the pitch employed is such as "*to cause the stock to travel by gravity at a velocity approximately equal to the speed of the making wire*," which the patentee declared "*to be a new principle of operation.*"

As pointed out by the Court of Appeals in this case, the patentee in eighteen places in his specification and claims refers to gravity, due to pitch of the wire, causing the stock to move at a speed approximately equal to the speed of the wire, whereby the drag of the stock by the wire is eliminated.

At one point in the specification the patentee states that he *maintains the breast-roll end of the wire at a high elevation so that the stock travels by gravity much faster than the making wire ordinarily runs*, and he then *increases the speed of the machine so as to bring the rate of speed of the wire up to the speed of the stock* (Spec. p. 2, lines 39-50).

This clearly shows that it is the plan of the patentee Eibel to totally eliminate any drag or pull of the stock by the wire. The same idea is brought out again in the specification (p. 2, lines 58-64) where the patentee says: "*Furthermore as the stock is moving with the paper-making wire instead of being moved by the wire or essentially by the wire, the formation of the paper will begin at the start and will continue to the end of the travel of the stock with the wire.*"

Nothing can be plainer than these statements of the specification that the pitch or inclination given to the wire is to be sufficient to cause the stock by gravity due to pitch to travel at approximately the same speed as the wire, thereby eliminat-

ing all drag of the stock by the wire.

Plaintiff's difficulty, however, is that if this is recognized as the "critical point" which differentiates the Eibel operation from the operation of prior art structures, then there never was any use of the Eibel invention, either by plaintiff or its licensees, or by this defendant, because with an ordinary Fourdrinier machine if the screen or making wire is given a sufficient pitch to cause the stock to travel by gravity at the speed of the wire, thereby eliminating drag of the wire on the stock, the breast-roll end of a machine, of the size of defendant's, must be elevated 48 inches if a 2-inch head in the flow box is employed, and neither plaintiff, nor defendant, nor anyone else, ever gave a 48-inch elevation to a Fourdrinier screen.

With this somewhat general discussion of the main points involved in this case, we pass to a more detailed examination of Fourdrinier machines and of the specification and claims of the Eibel patent.

II.

PRINCIPAL QUESTIONS AT ISSUE.

General Features of Fourdrinier Machines.

The principal features of a Fourdrinier machine are the following:

(1) An endless wire sieve woven with sixty or seventy meshes to the inch in common practice and often seventy-five feet long and one hundred inches or more wide, said wire being supported at the end which receives the stock by a large roll called the breast-roll, and at its other end by a roll, to which power is applied, called the couch-roll. The wire passes over an intermediate roll called the guide-roll, which is located quite near the couch-roll.

(2) A flow box into which is pumped a constant supply of the paper-making stock, consisting usually of fibers of wet pulp

with or without added mineral matter, the whole being mixed with from 135 to 200 times its weight of water, and having the appearance of diluted milk. The stock passes from this flow box, in a constant stream, on to the breast-roll end of the making wire.

(3) About twenty feet from the breast-roll a series of suction boxes are placed beneath and in contact with the under surface of the wire. A partial vacuum is maintained within these boxes so that, through the agency of the atmospheric pressure upon the upper surface of the wet pulp, a greater part of the water then remaining in the paper stock is forced out of the pulp into these boxes, so that very little free water remains in the wet web of paper after this has passed beyond the suction boxes.

These are the essential features of a Fourdrinier machine. Such a machine, of course, comprises, in addition, many details of construction and equipment, some of which are described in the opinion of Judge Mayer in the Remington-Martin case (234 Fed. 624), and in the record (pp. 12-14). The matter before this court, however, relates only to the degree of pitch given to the wire sieve, generally termed the making wire, by the relative elevation of the breast-roll and guide-roll; two of the claims of the patent in suit bringing in the position of the suction boxes.

Operation of These Features of the Machine.

The stock passes from the flow-box through an opening in the wall thereof, generally called the "slice" opening, and flows onto the sieve at a point substantially over the top of the breast-roll. The stock is carried along on the sieve, draining off its water as it goes, until, before the suction boxes are reached, the greater part of the water has drained away. The remaining water is mainly taken out by the suction boxes, and

after passing the suction boxes the pulp is in the form of a uniformly distributed wet sheet, which, when it reaches the end of the making wire, has sufficient strength to hold together as it is carried across to, and through, a series of pressing rolls and drying calenders from which it is rolled up as complete paper.

In Every Fourdrinier Machine Stock Must Be Brought to Speed Equality With Wire.

It is obvious that in the operation of any Fourdrinier machine the stock must be brought to speed equality with the wire before the suction boxes are reached. The stock and the wire may travel at different speeds before the water has largely drained out of the stock, but after the water has mainly drained out and the fibers of stock have settled upon the wire, the stock and the wire must travel together and at the same speed. This is true of course of any Fourdrinier machine.

Usual Point of Speed Equality.

While there will be some variation in the point at which sufficient water has left the stock to cause the latter to settle upon the wire, so as to move therewith, the evidence of the experts in this case, both for plaintiff and defendant, agrees that in all of the machines examined by them this point of speed equality is about ten feet from the slice, or point where the stock enters upon the wire, or about half way from the slice to the suction boxes (Rec., p. 48; Aldrich XQ94). This means that in machines the size of defendant's in which the distance from the center of the breast-roll to the center of the guide-roll is twenty-nine feet, the point of speed equality between the stock and wire is about one-third the distance from the breast-roll to the guide-roll, and the suction boxes are located at about two-thirds the distance from the breast-roll to the guide-roll.

DIFFERENCE BETWEEN SPEED OF WIRE AND INITIAL SPEED OF STOCK.

It is assumed in the Eibel patent, and asserted by plaintiff's expert, that except in very slow running machines the stock must flow onto the making wire at a rate of speed much below the speed of the wire, and that prior to Eibel the speed equality between stock and wire had always been brought about by the drag of the wire on the stock.

Referring to this subject matter Aldrich, plaintiff's expert, says:

"The original purpose of the slice was to keep the froth and chips, if any, upon the surface of the stock from flowing on to the wire and causing breakage of the paper with the loss of production incident thereto; but it has also the effect in so far as it assists in the maintenance of a hydraulic head of giving a substantial speed to the stock as it flows upon the wire. If the head in the flow box is, for example, two and a quarter inches, the speed with which the stock at the bottom of the stream will flow to the wire will be substantially 200 feet per minute. Various mechanical difficulties, which need not be stated here in detail, limit the amount of head which can conveniently be carried in the ordinary Fourdrinier machine, and so limit the initial velocity which can be given to the stock.

Accordingly, if the paper-making wire under these conditions is run at a speed not exceeding 200 feet, the wire has no work to do in the way of causing the stock to attain the speed of the wire, since the stock starts at that speed. If, however, the wire runs at 400 feet a minute, as was occasionally done on news machines, that is, machines making news paper, at the time of Eibel's invention, then the making wire would be moving at a speed twice that of the stock coming on to the wire under a head of two and a quarter inches, and the wire would be drawn out from under the paper stock, causing under these conditions waves and ripples, until the wire had by its friction given to the stock approximately the speed of the wire; that is, as Eibel says, until an equilibrium has been established" (Rec., pp. 16-17).

PLAINTIFF'S EXPERT ASSUMES ONLY LOW INITIAL SPEED CAN BE EMPLOYED.

It is evident that if the making wire is horizontal, and the initial speed of the stock is less than the speed of the wire, speed equality between stock and wire can only be brought about by the dragging action of the wire upon the stock.

Eibel in his patent says that this dragging action causes waves or ripples in the sheet, which he proposes to avoid by pitching the wire, instead of having it horizontal, and thus accelerating the travel of the stock and bringing about speed equality between stock and wire by gravity due to pitch of the wire. Eibel assumes there must be a great difference between initial speed of stock and speed of wire. Aldrich, as we have seen, assumes two hundred feet as the initial speed at which the stock will enter upon the wire in his description of the Eibel invention, and he gives the impression, if he does not so directly state, that if the machine is to be run at a high speed of six hundred feet or more, this low initial speed of two hundred feet per minute must still be maintained, and the stock accelerated the difference of four hundred feet, or more, after it enters upon the wire, either by gravity due to pitch, or by the drag of the wire itself.

A careful reading of the decision of the Court of Appeals in the Remington-Martin suit shows clearly that in writing this decision Judge Mayer believed that the initial speed of the stock could not be increased above two hundred feet per minute, and that, if the speed of the wire was to be increased beyond four hundred or four hundred and fifty feet per minute, which was the limit of speed, as he understood the art prior to Eibel, at which paper machines could be operated, the acceleration of the stock to speed equality with the wire must be brought about *after* the stock entered upon the wire, and that without knowledge of the Eibel invention, the only way

this could be done was by using the drag of the wire, which necessarily resulted in waving and irregular sheets of paper.

An examination of the opinion of Judge Hale in the present case shows that he also is under the impression that when the machine is run at a high speed there must be an "excessive difference of speed between the wire and the stock" (267 Fed., p. 848).

Both Judge Mayer and Judge Hale were evidently of opinion that this excessive difference of speed between the wire and the stock, made it impossible to speed the machines up above four hundred feet per minute, except by employing the alleged Eibel invention.

Factors That May Be Employed to Bring About Speed Equality Between Stock and Wire.

It is evident that there are three factors which may be employed separately, or any two, or all three of which, may be employed together in any preferred relative proportions, to bring about speed equality between the stock and the wire. These are the following:

(1) *Drag of wire:* The making wire may obviously be run horizontally and the stock flowed onto it at a very low initial speed in which case the acceleration between the low initial speed of the stock and the speed of the wire, must be brought about entirely by the drag of the wire. This is what Eibel states was the method employed prior to his invention in the operation of Fourdrinier machines.

The Eibel patent is silent as to the initial head. It ignores the same, and, as pointed out in the testimony of Carter, to which we shall hereinafter refer, Eibel evidently contemplated using the lowest possible head with which the stock could be flowed onto the wire. Plaintiff's expert, Aldrich, assumes a head of two and a quarter inches, giving an initial

flow of the stock of two hundred feet per minute, and says there is a limit to the initial velocity which can be given to the stock; that the Eibel invention is not "to be thought of in connection with the head at all;" that it "can be employed without any head at all."

(2) *Initial velocity due to head:* The record in this case shows that it is entirely practical to employ a sufficient head in the flow box so that the initial velocity of the stock will approximate, or, if desired, equal the speed of the wire. In such cases the drag of the wire has nothing to do, but the stock enters upon the wire sufficiently close to the speed of the wire, for all practical purposes, and the wire can be operated in a horizontal position.

There are two instances in the record of such high heads, successfully employed, in high speed machines, to flow the stock onto the wire at an initial speed approximating the speed of the wire.

The first is in the case of the Champion Paper Company at Carthage, New York. The record shows that this company was using a pitched wire, and running its Fourdrinier machine, which was an old machine of light construction, not to exceed five hundred feet per minute. It was sued by the plaintiff herein for infringement of the Eibel patent. It dropped the wire to a horizontal position, raised the head in the flow-box to ten inches, thereby giving the stock an initial velocity as it flowed upon the wire of about four hundred and forty feet per minute, and increased the speed of its machine from five hundred to five hundred and forty feet per minute (Rockwood, Rec., p. 633; Cadwell, p. 641).

The other instance is shown by the affidavits of James M. Murray and A. W. Bronk, stipulated as depositions into this record (Rec., p. 999).

In this instance plaintiff's licensee, the International Paper Company, a stockholder of the plaintiff company and licensed

under the Eibel patent, after using a pitched wire for several years upon two of its machines in the Glen mill at Berlin, N. H., in July, 1918, dropped the making wire in such machines to a horizontal position; adopted an eight inch head in the flow-box, thereby getting an initial velocity to the stock of *about three hundred and ninety-one* feet per minute, and continued to operate the machine at the same speed at which it had been operated, when using the pitched wire licensed under the Eibel patent. Both machines when the change was made were withdrawn from the Eibel license (Rec., p. 999).

(3) *Gravity due to pitch of wire:* The third factor that may be employed to bring about speed equality between the stock and wire is acceleration of the flow of the stock by gravity due to a pitch or inclination given to the making wire. This is the factor that is set out and claimed in the Eibel patent, and the use of which is asserted to eliminate the drag of the wire, and to constitute the principle of the Eibel invention.

It is clear that this patent was granted by the Patent Office on the idea that Eibel was employing gravity due to pitch as the *sole* means of securing speed equality between stock and wire. No mention whatever is made, in the patent, of initial velocity of stock. The flow-box is neither illustrated nor described in the Eibel patent. The specification of the Eibel patent describes the operation as, first, *giving the wire such a pitch that the stock will accelerate by gravity to the speed at which it is desired to run the machine*, and, second, *speeding up the machine until the speed of the wire equals the speed of the stock* (Spec. p. 2, lines 39, 49. Italics ours).

This clearly means that the stock is to flow by gravity due to pitch alone, at a speed equal to that at which it is desired to run the wire. In other words, Eibel proposes in his patent to completely eliminate the drag of the wire as a factor in securing speed equality between stock and wire. He ignores the initial velocity of the stock altogether and plaintiff's expert,

Aldrich, states that the Eibel invention can be employed without any head at all (Rec., p. 69; XQ230).

GRAVITY FEED PRODUCED BY HIGH HEAD AND LOW PITCH OR LOW HEAD AND HIGH PITCH.

It will be seen from what we have already stated that the factors of head and pitch for securing speed equality between the stock and the wire are correlated, and that by increasing either one the other may be decreased, without changing the resulting gravity feed of the stock. This is admitted by all the experts. Aldrich has testified upon this point (Rec., p. 45).

And defendant's witness, Livermore, in referring to the velocity or speed of the stock on the wire, says:

"In all of the cases, including the defendant's, there are variable factors, namely, the speed of the wire, the initial head, and the pitch or slope of the wire, each of which may be varied, in accordance with the judgment of the operator, and two of which, namely, the head and the slope, have a controlling influence on the actual velocity of the liquid" (Rec., p. 975).

This simply means that any operator of a Fourdrinier machine may get a certain gravity feed of the stock at a given point on the wire by using either a low head and a high pitch, or a high head and a low pitch, and that his judgment will tell which it is best to use. This principle is fully explained by the several expert witnesses who have testified in the case (Rec., Allen, pp. 945-955; Livermore, p. 975; Carter, pp. 889-890; Kinney, p. 564). All of these witnesses have testified that the Trautwine table "Defendant's Exhibit T-8," gives the correct velocity per minute for each inch of head there indicated, whether such head be in the flow box, or in the pitch of the wire, or in the two combined in any desired ratio.

SPEEDS PRODUCED BY DIFFERENT RELATIONS OF PITCH AND HEAD.

For the purpose of showing the actual variations in speed produced by different amounts of head and pitch in Four-

drinier machines, we produce the following table, in which the figures at the left indicate amount of head in the flow box; the figures in the second column the initial speed at which the stock will enter upon the wire under the different heads; and the figures in the following columns the speed that the stock will attain, at a point one-third the distance down from the flow box, towards the guide-roll, with the amounts of head and pitch indicated:

	Initial Speed	3″Pitch	6″Pitch	9″Pitch	12″Pitch	15″Pitch
0 Head	00	138.6	195.6	240.6	276.6	308.4
3″ "	240.6	276.6	308.4	340.2	366.6	391.0
6″ "	340.2	366.6	391.0	417.0	438.0	459.0
8″ "	391.0	417.0	438.6	459.0	481.8	500.4
10″ "	438.6	459.0	481.8	500.4	518.4	538.8

It is interesting to note that a three-inch pitch, which plaintiff's counsel calls "slight" or "trivial," with a six-inch head in the flow box, gives exactly the same result, in securing speed equality between stock and wire at a point one-third the distance down from the flow box, as would a three-inch head, and a twelve-inch pitch on the wire, which both plaintiff's counsel and expert find to be a "high" or "substantial" pitch. It is further interesting to note that an eight-inch head and a three-inch pitch gives a considerably greater speed, at the same point on the wire, than a three-inch head in the flow box and a fifteen-inch pitch on the wire.

That a low pitch—even a flat wire—with a high head is entirely practicable is demonstrated by the action of the Champion Paper Company which, as we have stated, after being sued for infringement of the Eibel patent abandoned a pitched wire altogether and adopted a flat wire with a ten-inch head.

This fact is further demonstrated by the action of plaintiff's licensee, International Paper Company, which, as we have shown, has recently abandoned pitched wires, on two of its machines, given up its Eibel license, and adopted an eight-inch

head and a flat wire, running the machine thereafter at the same speed previously used with the pitched wire under the Eibel license.

NO INFRINGEMENT OF EIBEL PATENT UNLESS GRAVITY DUE TO PITCH IS EMPLOYED AS EITHER THE SOLE OR THE PREDOMINATING MEANS OF SECURING SPEED EQUALITY BETWEEN STOCK AND WIRE.

As we have stated the Eibel patent clearly proposes to bring about speed equality between stock and wire solely by gravity due to pitch of the wire. Plaintiff's expert in his *prima facie* testimony admitted and asserted that to constitute an Eibel installation gravity due to pitch must be the predominating factor in bringing about such speed equality; that in any Eibel installation acceleration due to drag of wire was "insignificant," and that he didn't think the Eibel invention "is to be thought of in connection with the head at all" (Rec., p. 69).

It will be conceded that if a Fourdrinier machine is operated in either of the following ways, it will not be an infringement of the Eibel patent:

(1) If it is operated with a horizontal wire onto which the stock is brought at a low initial velocity, and the drag of the wire is relied upon solely to bring the stock up to speed equality with the wire.

(2) If it is operated with a horizontal wire, and a high head in the flow box, so that the stock enters upon the wire with an initial velocity approximating, or substantially equal, to the speed of the wire, as in the Champion Paper Mill above referred to, or as in the Glen mill of the International Paper Company, since it abandoned its license under the Eibel patent.

If it is conceded that stock may be brought onto the making wire of a Fourdrinier machine, and into speed equality with the wire, without using the Eibel invention or infringing the Eibel patent, the question arises whether plaintiff, under

the Eibel patent, can hold every structure for feeding the stock to the wire and securing speed equality between stock and wire, in which gravity, due to a pitched wire, is employed.

In other words, can any operator of a Fourdrinier machine employ, to any extent, gravity due to pitch, combined with initial velocity due to head, or with acceleration due to drag of wire, to bring about speed equality between stock and wire, without infringing the Eibel patent.

Or can such operator employ, to any extent, gravity due to pitch, combined with *both* initial velocity due to head, and acceleration due to drag of wire, to bring about speed equality between stock and wire without infringing the Eibel patent.

The answer to this last question, which defendant submits must be answered in the affirmative, will decide the present case, because it is conceded that defendant does, in all of its machines, use *to a small extent* gravity due to pitch, combined with a greater drag of the wire, and a still greater initial velocity due to head.

Defendant's Machines Do Not Infringe.

Defendant's primary defense in this case is that, even conceding the Eibel patent to be valid, defendant does not infringe any of its claims for the following reasons:

The Eibel patent requires that the stock be brought to speed equality with the wire by gravity due to pitch of the wire. The face of the patent itself makes this clear. Plaintiff's counsel, in the Remington-Martin suit, and in arguments on the motion for preliminary injunction in this case, as we shall point out later in this brief, stated this fact over and over again. Plaintiff's expert repeated it many times, and asserted that in any Eibel installation gravity due to pitch must be the predominating factor in securing speed equality between stock and wire; that if in any machine the predominating factor in securing

such speed equality was not gravity due to pitch then the Eibel invention was not employed (Rec., p. 42).

In defendant's machines, as originally installed, and as machines 1, 3 and 4 are now operated, speed equality between the stock and the wire, which runs at 585 feet per minute, is brought about by the following factors in substantially the proportions specified:

Initial Velocity Due to Head (6 inches)	330 feet = 56.5%
Acceleration Due to Drag of Wire	137 feet = 23.4%
Gravity Due to Pitch	118 feet = 20.1%

In defendant's No. 2 machine, as operated since August, 1917, these factors are:

Initial Velocity Due to Head (6 inches)	330 feet = 56.5%
Acceleration Due to Drag of Wire	190 feet = 32.4%
Gravity Due to Pitch	65 feet = 11.1%

It is clear from these figures, given by both of defendant's experts, Carter and Livermore, and not questioned by plaintiff's expert, Aldrich, that in none of defendant's machines is gravity, due to pitch of the wire, either the *sole*, or the *predominating* factor in bringing about speed equality between stock and wire.

Defendant says, therefore, that even if the Eibel patent is valid, as held by the Court of Appeals of the Second Circuit in the Remington-Martin case, this defendant does not infringe.

Defendant further says that while plaintiff's expert contends that it is not necessary under the Eibel patent for the stock to be brought to speed equality with the wire by "gravity due to pitch" *alone* (which defendant asserts is called for by the terms of the specification and claims of the Eibel patent) this expert asserts repeatedly that gravity due to pitch must be the "predominating" factor in bringing about such speed equality in any Eibel installation. Applying this test defendant's machines do not infringe because in all of them the head of stock in the flow box, which governs the initial speed of the stock

as it enters upon the wire, is the *predominating* factor in bringing about this speed equality; the second factor is the drag of the wire, while only the smallest factor is gravity due to pitch.

Again, defendant says that as the specifications and claims of the Eibel patent are specifically limited to obtaining speed equality between stock and wire solely by gravity due to pitch, these claims cannot be construed to cover defendant's machine in which speed equality between stock and wire is obtained primarily by "head" and "drag of the wire" and only in a minor degree, as in the prior art, by "gravity due to pitch." Even if the specification and claims of this patent be construed, as was done by plaintiff's expert in his *prima facie* testimony, to require that the gravity feed due to pitch be the *predominating* factor in bringing about speed equality, defendant's machines do not infringe because in its machines the gravity due to pitch acts only to the extent of from eleven to twenty per cent of the total acceleration required to bring about such speed equality.

Again defendant says that it does not use the so-called Eibel principle because of the limitation, on the face of the Eibel patent, to *equality* between the gravity feed due to pitch and the speed of the wire; whereas defendant's gravity feed due to pitch is so far from being equal to the speed of the wire as to be less than half. Plaintiff is endeavoring in this case to strike out "equality" from the Eibel claims and substitute "superimposed." This, though erroneously sanctioned by the District Court, can only be done by reissue.

Defendant further alleges non-infringement on the face of the opinion of the Circuit Court of Appeals of the Second Circuit in the Remington-Martin case, which expresses the same limitation (page 8, line 30), by requiring that there shall be "no obstruction to the natural flow of the stock under the influence of gravity," and (page 12, line 23), that "gravity will accelerate the stock to speed equality with the wire." It is an

absolute contradiction of terms to pretend that less than half is "equality."

The limitation hereinbefore pointed out in the Eibel claims is necessary to save the patent from invalidity under Section 4888, R. S.

This was the view of the Circuit Court of Appeals in this case. After pointing out that in the operation of defendant's machines 56% of the speed of the stock was due to head and only 24% to pitch, accepting plaintiff's measurements, or 20% accepting defendant's measurements, the court says:

"On this showing, even if the patent is valid, there is no infringement, except on the theory that the patent covers any substantial use of pitch to decrease the drag on the wire. If the patent means, as the Court of Appeals for the Second Circuit apparently held in the Remington-Martin case, 234 Fed. 624, that pitch adequate to bring the stock to speed equality is Eibel, there is no infringement. It would take a 48-inch pitch with a 2-inch head to relieve the wire of all drag. Even if the patent means that pitch must be the predominating force, there is no infringement; the defendant's predominating force is head" (Rec., p. 201).

OTHER CONTENTIONS OF THE DEFENDANT-APPELLANT IN THIS CASE.

Defendant further contends:

(1) That the alleged Eibel invention consisting as construed by plaintiff in giving to the breast-roll end of an ordinary Fourdrinier machine an elevation of five inches or more, differs merely in matter of degree from machines of the prior art, in which, as conceded by plaintiff's expert it was customary to elevate the breast-rolls two, three or four inches; the elevations used in the prior art necessarily producing a gravity feed due to pitch, differing only in degree from that produced by an elevation of five inches which plaintiff's expert says is the Eibel invention.

(2) That in determining the question of invention in the Eibel patent over the prior art, comparison must necessarily be made between the *highest* elevation, or *greatest* pitch, admitted or proven to have been used in prior art machines, and

the *lowest* elevation, or *least* pitch, asserted by plaintiff to constitute the Eibel invention.

(3) That it must be held, in order to sustain the Eibel patent, that invention was required to raise the breast-roll end of a Fourdrinier machine from a three-inch elevation, conceded *by plaintiff to have been* provided on various machines prior to Eibel, to a five-inch elevation, which it is asserted by plaintiff's expert constitutes the Eibel invention; the difference in gravity feed produced by a three-inch elevation and that produced by a five-inch elevation being admitted by plaintiff's expert to be merely a difference in degree.

(4) That the Eibel patent cannot be construed to cover the operation of defendant's machines without, at the same time, making it cover the operation employed in many machines of the art in use long before the date of the alleged Eibel invention.

(5) That the principle or method upon which defendant operates its machines is identical with that shown by this record to have been employed in the operation of many machines prior to the date of Eibel's alleged invention.

(6) That claims 7 and 8 of the Eibel patent are exactly anticipated by the prior art shown in this record.

(7) That the Eibel patent in suit is invalid by reason of anticipation by patents and machines of the prior art unless its claims are limited as hereinbefore specified, in which event it is not infringed by any of defendant's machines.

(8) That the Eibel patent, as construed by plaintiff, and as construed by the District Court in its opinion, is void for want of invention in view of the patents of the prior art in the record, and numerous machines shown to have been in use before the date of Eibel's alleged invention.

Before discussing in detail the specification and claims of the Eibel patent and the evidence respecting the prior art found in the record, we desire to emphasize the fact that the only difference between the Eibel invention, as defined by the District Court, adopting the argument of plaintiff's counsel in the court below, and what was used in numerous machines prior to Eibel, as conceded by plaintiff's counsel and expert, is a mere change in the degree of the gravity feed due to pitch, resulting from giving the breast-roll end of the wire a somewhat greater elevation. According to plaintiff's expert raising the breast-

roll end of the making wire two inches (from a three-inch elevation to a five-inch elevation), on a twenty-nine foot straight stretch of wire from breast-roll to guide-roll, is sufficient to make the difference between a "slight" or "trivial" pitch, of no effect upon the gravity feed of the machine, and a "substantial" pitch revolutionizing the operation of these machines. Because a three-inch pitch was old in the prior art, such a pitch is designated, by plaintiff's counsel and expert, as a "slight" or "trivial" pitch. But defendant has shown, in its No. 2 machine, that a six-inch pitch, when supplemented by a proper head in the flow-box, produces as good or better paper than a higher pitch. Hence, in its efforts to hold this machine as an infringement, plaintiff must denominate a five or six-inch pitch as a "substantial" pitch and within the Eibel invention and patent.

ACTUAL DIFFERENCE IN ACCELERATION OF STOCK PRODUCED BY A THREE-INCH PITCH AND A FIVE-INCH PITCH.

Of course, plaintiff cannot change the actual effect produced by the use of a five-inch pitch, or a three-inch pitch, by designating the former a "substantial" pitch, revolutionary in its character and within the Eibel invention and patent, and designating the latter as a "slight" or "trivial" pitch, of no effect in the operation of the machine.

The actual difference between the acceleration of the stock, or the gravity feed due to a five-inch pitch, at a point one-third the distance down the wire from the slice, and the gravity feed due to a three-inch pitch, is instantly determined by referring to Defendant's Exhibit T 8 "Reproduction of Page 258 Trautwine's Engineer Pocket-Book," identified by all of the experts in this case as a standard authority upon the velocity of water due to gravity or head (Rec., following p. 1086, Sheet 147).

This table shows that with a three-inch pitch on the wire,

the gravity feed of the stock due to the pitch, or in other words the velocity of the stock produced by such pitch at a point one-third the distance down the wire, is one hundred and thirty-eight feet per minute, while the gravity feed produced at the same point upon the same wire by a five-inch pitch, is slightly over one hundred and seventy-five feet per minute.

Is it reasonable to say that a pitch that produces a gravity feed at a point ten feet from the breast-roll, or slice of the flow-box, of one hundred and seventy-five feet per minute is a "substantial" pitch, within the Eibel invention, while a pitch of three inches that produces a gravity feed, at the same point, of one hundred and thirty-eight feet per minute is a "slight" or "trivial" pitch?

We desire to repeat that in determining the patentability of the Eibel invention, and the scope of its claims, comparison must be made between the highest pitch that is admitted by plaintiff, or is proven, to have been used in the prior art, and the lowest pitch that is claimed by plaintiff to be included in the term "substantial" pitch as used in the Eibel patent.

While defendant claims that the prior art shows beyond question that it was not uncommon, to use pitches of from four to six inches, if we accept plaintiff's own figures of a three-inch pitch for the prior art, and a five-inch pitch as a "substantial" pitch within the Eibel invention, we find that the only difference between the two is that in the machines of the prior art, having the three-inch pitch, the gravity feed, produced by the pitch of the wire, was one hundred and thirty-eight feet per minute, at a point ten feet from the slice, while the gravity feed produced by a five-inch pitch, at the same point on the same machine, designated by plaintiff's expert as a "substantial" pitch embodying the Eibel principle and invention and included in his claims, is one hundred and seventy-five feet per minute.

Plaintiff gives no reason why a five-inch pitch producing a

gravity feed of one hundred and seventy-five feet per minute, at a point ten feet down the wire from the slice, is a "substantial" pitch, revolutionizing the operation of Fourdrinier machines, and a three-inch pitch producing a gravity feed of one hundred and thirty-eight feet per minute at the same point, is a "slight" or "trivial" pitch.

Aldrich admits, as we have pointed out, that the difference between the two is merely a difference in degree. There is no critical point between a three-inch pitch and a five-inch pitch, where the "slight" or "trivial" pitch becomes a "substantial" or "consequential" one. There is no point between the two where a *slight* pitch becomes a *substantial* one, or where an *ineffective* pitch becomes an *effective* one.

PROVISION FOR THREE-INCH PITCHES ON PRIOR ART MACHINES ADMITTED IN PLAINTIFF'S BRIEF.

In their brief in the court below counsel for plaintiffs say:

"The maximum possible pitch on the Bayless machine was not over 3 inches" (Brief p. 121).

"The greatest practicable pitch which could have been obtained on these machines (Kimberly-Clark) was 2½ to 3 inches" (Brief p. 133).

"Summarizing this Bagley & Sewall story * * * the breast-roll might be raised * * * as much as three inches in some cases," etc. (Brief p. 143).

Bayless used a head of from four to six inches (Rec., pp. 682, 695, 716), Kimberly-Clark used about the same head (Rec., p. 339). Bagley & Sewall machines were run with a head of from six to eight inches (Rec., Kinney, p. 557; Lansing, p. 653).

We have therefore these direct admissions that these machines of the prior art were provided with three-inch pitches. As we have pointed out this amount of pitch on the wire coupled with the high heads used on these machines gave nearly as great a speed at one-third the distance down from the slice as defendant employs on any of its machines.

THE ALLEGED EIBEL INVENTION.

Briefly stated the alleged Eibel invention consists merely in blocking or jacking up the stock-receiving or breast-roll end of an ordinary Fourdrinier paper-making machine, so as to cause the making wire to have a greater pitch than what, it is asserted, had been previously used in this class of machines.

Plaintiff asserts that the Eibel patent does not require any particular elevation or pitch of wire, but that the invention is employed whenever the wire is given a "*substantial*" elevation.

Plaintiff's expert testifies that the Eibel invention is employed in any Fourdrinier machine having the breast-roll end of the making wire elevated five inches or more (Aldrich, Rec., p. 68).

It is conceded by the same expert that before Eibel the making wires of such machines had been elevated from two to four inches at the breast-roll, although plaintiff's counsel, in their brief in the court below contend that none of the prior art machines had a pitch greater than three inches.

QUESTION OF PATENTABLE INVENTION INVOLVED.

Assuming that the actual amount of elevation in the prior art machines to be what plaintiff's expert admits—from two to four inches, or three inches as claimed by plaintiff's counsel—one specific question before this court for decision is this:

Was it a patentable invention to increase the pitch of the making wire from a concededly old three-inch pitch to a five-inch pitch asserted to be a "substantial" pitch, within the scope of the Eibel invention and the claims of the Eibel patent?

UNIMPORTANT WHETHER ELEVATION SHOWN IN PRIOR ART MACHINES IS 2, 3 OR 4 INCHES.

While it is claimed that Eibel actually employed, and that

the drawings of his patent show, an elevation of substantially twelve inches at the breast-roll end of the wire, this fact is entirely unimportant on the question of comparison between the old and the new, in view of plaintiff's claim that a *five-inch elevation constitutes the Eibel invention*. We do not need to discuss, therefore, the change from the conceded three-inch elevation of the prior art, to the twelve-inch elevation, said to be illustrated in the Eibel patent, because it is obvious that if a five-inch pitch is the Eibel invention, the entire question of patentability must depend upon a comparison of the *lowest elevation that is within the Eibel patent with the highest elevation, conceded or actually proven, of the prior art*.

Of course, plaintiff endeavors in discussing novelty of Eibel to keep to the front the twelve-inch elevation of the drawings of his patent, and to compare this elevation with the three-inch elevation plaintiff concedes as prior art. If, however, plaintiff were to define a "substantial" pitch as not less than that produced by the twelve-inch elevation shown in the drawings of the Eibel patent, it would be placed in an embarrassing position on the question of infringement, because the record shows that defendant's machine No. 2, operated with a six-inch pitch, is at least as efficient and produces as good paper as the machines having the thirteen-inch pitch with which all were originally equipped.

Plantiff's counsel cannot, however, base their argument of invention upon a comparison of the twelve-inch pitch, which they claim is shown in the Eibel drawings, with the three-inch pitch which they concede to be old in the art. Having admitted that a five-inch pitch is a "substantial" pitch within the meaning of the Eibel patent and constitutes the Eibel invention, the Eibel patent must, as we have already stated, be tested on the question of patentable invention by a comparison of the five-inch pitch, said to be Eibel, producing a gravity feed on the wire ten feet from the slice of *one hundred and seventy-five feet*

per minute, with the three-inch pitch, conceded to be prior art, and producing a gravity feed at the same place on the wire of *one hundred and thirty-eight feet* per minute.

In Last Analysis Question of Invention Involved Is Very Simple.

In the last analysis the question of invention involved in this case, accepting plaintiff's construction of the claims, is a very simple one, and, as we view it, should be decided against the patentee upon the following claims and admissions of plaintiff's expert, Aldrich.

This witness claims, as we have stated, that the Eibel invention is employed in any Fourdrinier machine having the breast-roll end of the paper-making wire arranged at an elevation of five inches or more above the level (Rec., XQ223, p. 68).

The same witness admits that elevations of the breast-roll end of the wire of "something approximating" five inches had been used before Eibel (Rec., p. 42).

Plaintiff in its brief in the court below asserted that the prior art does not disclose a four-inch pitch, but it admits that three-inch pitches were provided on the Bayless machines (Brief, p. 121), the Kimberly-Clark machines (Brief, p. 128), and the Bagley & Sewall machines (Brief, p. 139). All of these machines were in use long prior to Eibel.

Since it is conceded by plaintiff's expert that the difference in effect between pitches of from two to six inches is only one of degree, we do not need to quarrel with plaintiff's counsel as to whether the prior art discloses the use of pitches of from four to six inches, which defendant claims, or merely three inches which plaintiff's counsel admit.

While the exigencies of plaintiff's case require plaintiff's counsel in argument to dwell upon the three-inch pitch that plaintiff concedes to have been common in the art prior to

Eibel, and the twelve-inch pitch disclosed in the Eibel drawing, this court must hold, in order to sustain the Eibel patent, in view of the foregoing testimony, that an increase of pitch from three to five inches, with no difference in operation, except in the degree of acceleration of the stock, constitutes a patentable invention.

It means, therefore, if the Eibel patent is sustained, that invention was required to increase the pitch of machines of the prior art, conceded by plaintiff to have been as great as three inches, to five or six inches, with absolutely no change in result except a somewhat greater acceleration of the speed of the stock upon the wire, admitted by plaintiff's expert to be merely a change in degree.

If the Eibel patent is sustained with the interpretation given its claims by the District Court, any user of a Fourdrinier machine, who, prior to Eibel, operated such machine with a three-inch pitch of the wire, getting a gravity feed due to such pitch, at a point ten feet down from the slice, of one hundred and thirty-eight feet per minute, who now elevates the breast-roll end of his wire two inches more, getting thereby a five-inch pitch, defined by plaintiff's expert as a "substantial" pitch within the Eibel invention and claims, is an infringer of the Eibel patent, although the effect of this additional pitch is merely to increase the gravity feed of the stock due to pitch only thirty-seven feet per minute, or from one hundred and thirty-eight feet per minute with the three-inch pitch at ten feet down from the slice, to one hundred and seventy-five feet per minute with the five-inch pitch at the same point on the wire.

We think the mere statement of this proposition which, as we have stated, in the last analysis is all there is to this case, not only demonstrates its absurdity, but its utter conflict with the settled principle of patent law that the owner of a machine in existence prior to any patented invention is entitled without restriction, to all of the uses to which such machine can be

put without reorganization.

It certainly cannot be claimed that there is any reorganization of the prior art machines when blocks are placed under their supports so as to increase the pitch of the wire from the three inches, plaintiff concedes to have been used before Eibel, to the five inches which it is asserted constitutes the Eibel invention.

IMMATERIAL WHETHER PRIOR USERS HAD SAME PURPOSE IN MIND.

It is urged by plaintiff that the pitches of three inches, more or less, conceded to have been employed in prior art machines were not for the purpose of accelerating the travel of the stock upon the wire, but merely for the purpose of increasing the drainage effect. While this is not true as a matter of fact, as conclusively shown by the testimony of several witnesses, and particularly by the testimony of Dickinson of the Lisbon Falls mills, as we shall hereinafter more specifically point out, this objection is immaterial, because whether the users did or did not have the accelerating effect in mind, such effect was present, and necessarily brought about a gravity feed of the stock, due to the pitch, at the same point on the wire, and consequently a smoothing of the sheet, in addition to the regulation of the drainage. We shall discuss this proposition more fully at a later point in this brief.

PRIOR ART MACHINES INCREASED GRAVITY FEED BY HIGHER HEAD.

Plaintiff's expert, Aldrich, has testified that the question of whether any given machine does or does not embody the Eibel invention, is not to be determined merely by the speed at which a machine may run; that a machine running at a speed as low as three hundred and fifty feet per minute, or even lower, and

with a wire pitch of only five inches, would employ the Eibel invention if the increase in speed of the stock "has been substantially made up by the pitch of the wire" (Rec., p. 68). Remembering that Aldrich assumes a head of two-and-one-quarter inches, producing an initial speed of the stock of two hundred feet per minute, in explaining the Eibel invention, let us compare the gravity feed produced by these conditions, at a point ten feet down the wire, where it is testified by all of the experts the gravity feed must practically cease to exist and the stock become attached to the wire to move therewith, with the gravity feed produced at the same point by several of the machines of the prior art, using the pitch plaintiff's counsel, in their brief in the court below, concede was employed.

The specific admission made in this brief as we have pointed out, is that prior to Eibel the Bayless-Austin, the Kimberly-Clark and the Bagley & Sewall machines each had a three-inch pitch.

Comparing the actual gravity feed on each of these machines at a point one-third of the length of the wire down from the slice, and with the initial head actually used on each, with the gravity feed produced by an Eibel installation having a five-inch pitch and a two-and-a-quarter-inch head, we get the following results:

	Stock Speed.
Eibel installation, head 2¼ in., pitch 5 in.	= 275 f.p.m.
Bayless-Austin installation, head 4 in., pitch 3 in.,	= 308 f.p.m.
Bagley-Sewall installation, head 8 in., pitch 3 in.	= 417 f.p.m.
Kimberly-Clark installation, head 6 in., pitch 3 in.	= 366 f.p.m.

This table shows that with the three-inch pitch on each of these prior art machines, conceded in the brief of plaintiff's counsel in the District Court to have been provided on such machines prior to Eibel, and with the actual head in the flow box, shown beyond question by the testimony of the witnesses to have been used with such machines, each of such machines

got a higher gravity feed of the stock at the critical point where the stock smoothes out—substantially ten feet from the slice—than is obtained by a five-inch pitch, testified by Aldrich to be an Eibel installation, and a two-and-a-quarter-inch head, also testified by him to be a proper head to use with an Eibel installation.

It is thus apparent that any one of these machines with the head and pitch employed on them prior to Eibel, more nearly eliminated the drag of the wire as a factor in bringing about speed equality between wire and stock, than could be done with the five-inch pitch and a two-and-a-quarter-inch head, which Aldrich characterized as an Eibel installation, and within the terms of the Eibel specification and claims.

In other words with any one of these prior art machines, as it is conceded they were constructed, the drag of the wire was called upon to do less work, even though the pitch employed is denominated by plaintiff's counsel "slight" or "trivial," than it would be called upon to do if the five-inch or "substantial" pitch of the Eibel invention were employed, with the two-and-a-quarter-inch pitch Aldrich uses to illustrate an Eibel installation.

It will be seen, therefore, that any of the machines above specified, comes nearer to eliminating the drag of the wire, as a factor in bringing about speed equality between stock and wire, than does a machine having a two-and-a-quarter-inch head and a five-inch pitch, characterized by Aldrich as an Eibel installation and an embodiment of the invention of the Eibel patent in suit.

III.

DETAILED EXAMINATION OF PATENT IN SUIT.

The Theory of the Eibel Patent.

The theory of the Eibel patent, as set forth in its specification and claims, is that by giving the wire what is called in the patent a "*substantial*" pitch, the water, carrying the ground-wood fibre and entering upon the breast-roll end of the wire, will be caused, by gravity, due to the pitch of the wire, to quickly accelerate to the speed of the wire. In other words, Eibel proposes to eliminate completely the drag of the wire as a factor in bringing the stock up to the speed of the wire. Eibel's theory may be stated in substance as follows:

In order to make paper at a speed, for example, of 585 feet per minute, tilt the machine to such an angle that gravity alone will bring the stock to a speed of 585 feet per minute, at the point on the wire where speed equality between the stock and the wire is to be obtained. Then speed up the wire to 585 feet per minute. The machine will then operate in accordance with the Eibel process and the principle of the Eibel invention.

Eibel does not say this in these words, but an examination of the patent, and of the testimony of plaintiff's expert in this case, as well as of the expert testimony offered by plaintiff in the Remington-Martin suit, a copy of which has been offered in evidence herein, and an examination of Judge Mayer's opinion, clearly shows that this is the theory of the patent that was urged upon the court by the plaintiff, without objection from the defendant, in the Remington-Martin suit, and is presented to this court in plaintiff's *prima facie* proofs herein. It was because the Court of Appeals of the Second Circuit did not find that anyone, prior to the date of Eibel's alleged invention, had operated a machine according to this Eibel theory that it sustained the patent. As no question was raised by defendant, in that case, as to its machines operating in accordance with this

Eibel theory, the Court of Appeals held three of the claims infringed.

In the Remington-Martin suit defendant did not examine any expert witnesses, but accepted, and permitted the court to accept, without challenge, the statements of plaintiff's expert as to the use of the so-called "Eibel principle" in the operation of the defendant's machines. The history of the art, as stated in the deposition of the plaintiff's expert, which was accepted by the Court of Appeals and quoted at length in its opinion, was in many particulars decidedly inaccurate and misleading. The defendant, however, permitted these inaccurate statements to pass unchallenged. The Court of Appeals was misled, both as to the actual operation of machines, and the usual speed thereof, prior to the date of Eibel's alleged invention, and as to the use of the alleged Eibel principle in the machines of the defendant in that case. If the court in the Remington-Martin suit had been correctly informed upon these two matters the decision of the case would have been the other way. We submit that there can be no question upon this point.

There was in the proofs in the Remington-Martin case a very inadequate and insufficient showing as to the speed at which prior art machines were operated and the amount of pitch given to their making wires.

THE EIBEL "PRINCIPLE."

It is claimed that Eibel discovered and announced a new "principle" in the operation of Fourdrinier machines. It is not claimed that he modified or changed in any particular the construction of such machines, but it is asserted that by raising the breast-roll end of such machines, either by screw-jacks, such as shown in his patent, or by ordinary wedges or blocks placed under the legs or standards of the frame, Eibel introduced a new principle of operation.

It is obvious that if a Fourdrinier machine is operated with a horizontal making wire, the speed of which is greater than the speed at which the stock passes on to the wire from the flow box or head with which the machine is provided, it will be necessary for the friction between the wire and the stock, or, as it is usually called, the "drag" of the wire, to bring the stock up to the wire speed, because it is self-evident that when the water has drained out and the stock has settled upon the wire in a thin film or sheet, it must thereafter travel with the wire, and at the same speed.

It is asserted by Eibel, in his specification, that prior to his invention Fourdrinier machines had usually been operated with the making wire horizontal, or at a very slight pitch, usually below the level, to provide for running with different grades of stock, and it is asserted that the "drag" of the wire had been the only factor operating to increase the speed of the stock from the initial speed at which it entered upon the wire, to an equality with the speed of the wire, which it must, of course, attain at least by the time the fibres settle upon the wire.

It is asserted that because this drag of the wire necessarily produced commotion among the fibres of the stock, it was impossible to run Fourdrinier machines at any considerable speed, and hence it is asserted that a speed of 450 feet per minute was considered, prior to Eibel's discovery, a high speed for a Fourdrinier machine, which was rarely, if ever, exceeded.

Referring to the time of Eibel's alleged invention, Aldrich, plaintiff's expert, quoting from the deposition of Little, plaintiff's expert in the Remington-Martin suit, testifies:

"Four hundred and fifty feet per minute was regarded as a very high speed, and up to that time had been seldom if ever exceeded and was generally regarded as about the maximum at which paper could be produced conveniently, for the reason that with a greater initial relative velocity between stock and wire than was represented by this speed the sheet would not smooth out in time to make a good paper" (Rec., p. 24).

In explaining the difficulties encountered in making paper, at what he claims was the highest obtainable speed at which machines were run at the date of Eibel's invention and when the stock was fed at a speed of 200 feet per minute, Aldrich testifies:

"Accordingly, if the paper-making wire under these conditions is run at a speed not exceeding 200 feet, the wire has no work to do in the way of causing the stock to attain the speed of the wire, since the stock starts at that speed. If, however, the wire runs at 400 feet a minute, *as was occasionally done on news machines*, that is, machines making news paper, at the time of Eibel's invention, then the making wire would be moving at a speed twice that of the stock coming on to the wire under a head of two and a quarter inches, and the wire would be drawn out from under the paper stock, causing under these conditions waves and ripples, until the wire had by its friction given to the stock approximately the speed of the wire; that is as Eibel says, until an equilibrium has been established" (Italics ours, Rec., p. 16).

Eibel proposed *to eliminate entirely the drag of the wire as a factor in bringing the stock up to the speed of the wire.* He proposed to give the making wire such an elevation *that gravity feed alone, due to the pitch of the wire, would cause the stock to attain the same speed as the wire at the point where the stock would settle upon the wire in a thin film or sheet. This is the so-called Eibel principle.*

We desire to emphasize this point, and therefore repeat that the whole theory of the Eibel invention, and the whole principle of the operation, as set forth in his patent, is to eliminate the drag of the wire, and to cause the stock to attain, by gravity feed alone, due to the pitch of the wire, the same speed as the wire. This position is not only made clear by the Eibel specification, and the testimony of plaintiff's expert in this case, but it is the principle that was set forth in the testimony of Little, expert for the plaintiff in the Remington-Martin suit, and was accepted by the Court of Appeals, in that case, as differentiating the Eibel principle from the operation of machines

of the prior art, and, as we have stated, it was never suggested in the Remington-Martin suit that the defendant's machines did not operate upon this principle.

It is, however, the crux of the defense, in the present suit, that the machines of the defendant herein do not use this Eibel principle. They rely upon the head, in the flow box, to give the stock an *initial velocity considerably more than half as great as the speed of the wire*, and then bring about speed equality *to a considerable extent by the drag of the wire*, and only *to a small extent by gravity due to the pitch of the wire*. In this respect defendant's machines operate upon exactly the same principle as machines in use prior to the date of Eibel's alleged invention.

Many of these prior art machines were running regularly at more than 500 feet per minute (showing that the statement of Aldrich that a speed of 400 feet per minute on news machines was only occasional is not correct).

Defendant's machines do not employ the Eibel principle or operate in accordance with the Eibel invention, whether that invention be construed as requiring gravity due to pitch to be the sole or only the predominating factor in bringing about speed equality between the stock and the wire.

In defendant's machine the predominating factor in securing such speed equality between stock and wire is (1) the initial velocity due to the high head in the flow box; (2) the accelerating effect due to the drag of the wire, which, instead of being eliminated, is very largely employed, and (3), to only a minor extent gravity feed due to the pitch of the wire.

THE EIBEL SPECIFICATION.

In the Eibel patent (page 1, lines 8-98), it is said:

"The Fourdrinier wire has usually been arranged to move in a horizontal plane, although I am aware that means have been provided for adjusting the breast-roll end of the wire to differ-

ent elevations, usually below the level, to provide for running with different grades of stock—as, for instance, with quick stock and slow stock; but so far as I am aware the *making wire has always had to perform the work of drawing along the stock*, and as the wire moved much faster than the stock the stock waved or rippled badly near the breast-roll end of the wire, which gradually diminished until an equilibrium was established and a smooth, even, and glassy surface presented, and not until the waving or rippling ceased did the fibres lay down uniformly and produce a well-formed sheet of paper." (Italics ours.)

(It will be shown later in this brief that the statement that the vertical adjustments of the breast-roll end of the wire to different elevations were "usually below the level" is not correct. It will be further shown that in the prior art machines the bringing of the stock to the speed of the wire has been brought about *principally* by the use of a head much higher than that used or contemplated by Eibel, and that in such prior art machines gravity, due to pitch, has been a substantial factor in bringing about this speed equality.)

Quoting further from the Eibel patent (line 98, p. 1, to line 8, p. 2):

"The machine has been run necessarily at a slow rate of speed to give ample time for the water to escape and for the fibres to lay down so as to make a uniform sheet, and in case the time was insufficient the breast-roll end of the wire has been lowered still farther until the desired result was accomplished. In accordance with my invention I operate entirely above the level *to cause the stock to travel by gravity at a velocity approximately equal to the speed of the making wire, which I believe to be a new principle of operation.*" (Italics ours.)

This statement alone is sufficient to show that Eibel considered his "new principle of operation" to consist in giving the wire such a pitch that the stock would be brought by gravity alone, due to pitch, to the speed of the making wire, thus eliminating the drag of the wire, which Eibel states had always, theretofore, "had to perform the work of drawing along the stock."

It is now argued that this statement is consistent with the idea that gravity, due to pitch, was only to be relied upon by Eibel to *lessen* the effect of the drag of the wire, and to *aid* in bringing about speed equality between stock and wire.

We submit, however, that this is not the principle set forth in the patent or contemplated by the language above quoted.

If there were any doubt upon this point it would be completely dispelled by further statements in the patent to which we call attention (p. 2, lines 9-16):

"The breast-roll end of the making wire *a* is maintained at a substantial elevation above the level, so that the wire declines. The declination of the wire is sufficient to enable the stock by gravity to move at a rapid rate of speed, which speed is substantially equal to the speed of the making wire, so that the waves or ripples are eliminated."

This can only mean that the wire is to be given such a declination that the speed given to the stock by gravity, due to pitch, will be substantially equal to the speed of the making wire. For instance, in defendant's machines the testimony shows that the making wire travels at a speed of substantially 585 feet per minute. To operate in accordance with the Eibel principle, as here set forth, defendant must give its making wire such a pitch that the stock will be caused by gravity due to the pitch of the wire, to move at the same speed, that is, a speed of 585 feet per minute, prior to the time when the water has drained out sufficiently to cause the fibres to settle upon and adhere to the wire. The statement of the patent, above quoted, does not mean that speed equality between stock and wire may be brought about, under the Eibel principle, mainly by the initial head, to a considerable further extent by the drag of the wire, and then only the deficiency made up by gravity due to the pitch of the wire.

Quoting further from the Eibel patent (p. 2, lines 39-48):

"For the purpose of increasing the speed of the machine to the maximum I maintain the breast-roll end of the making wire

at a high elevation above the level, so that the stock travels by gravity much faster than the making wire ordinarily runs for a certain grade of stock, and I then increase the speed of the machine to such extent as to bring the rate of speed of the making wire up to the speed of the rapidly moving stock."

This clearly means, if applied for instance, to defendant's machines, that the wire must be given such an incline that the stock will be brought *by gravity*, due to the pitch or incline, up to a speed of 585 feet per minute, and then the speed of the machine increased to such an extent as to bring the rate of speed of the making wire up to 585 feet per minute, the speed of the rapidly moving stock. That is to say, Eibel herein directs that the wire be inclined so as to bring the stock by gravity up to the desired speed and then the speed of the wire is to be brought up to the speed of this rapidly moving stock. In the case of defendant's machines this would mean that the wire should be pitched so as to give the stock by gravity alone, due to pitch, a speed of 585 feet per minute, and then the machine should be speeded up so as to bring the wire up to that same speed.

Not only is this the principle set forth in the specification, but this is clearly the method set forth and covered by the claims. Take the second claim, for instance. This claim calls first for the maintaining of the breast-roll end of the paper-making wire at a "high elevation," and then the claim specifies—

"whereby the stock is caused to travel by gravity faster than the normal speed of the wire for a certain grade of stock."

Aldrich says this means faster than "the normal speed with a horizontal wire" (Rec., p. 29). And of course it also means the maximum speed at which the wire is to be run, because the further direction in the claim is that the machine shall have

"means for increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly moving stock."

This can only mean one thing, and that is that if it is decided to operate a machine say at 585 feet per minute, the wire is to be given such an inclination as to cause the stock to be accelerated, by gravity, *due to the inclination of the wire* to that speed at the point where speed equality between the stock and wire is required; that is, the point where the stock loses its fluidity and settles upon the wire "in a smooth, even sheet." Then, having gotten the stock to travel at the desired speed, the machine is to be speeded up, according to the requirement of this claim, so as "to cause the wire to travel at substantially the same rate of speed as the rapidly moving stock." That would be, in the instance we have assumed, to a speed of 585 feet per minute, to which speed the stock must be accelerated by gravity due to the pitch of the wire. Plaintiff's witness, Aldrich, makes it clear in his testimony that the Eibel patent contemplates the acceleration of the stock to the speed of the wire, by pitch of the wire alone, and not by either an initial head, or by drag of the wire (Rec., pp. 68-69).

Testifying in the Remington-Martin suit, as appears from the printed copy of the record in that case, offered in evidence by plaintiff herein, Aldrich, plaintiff's expert in this case, stated that in an Eibel installation the drag of the wire was a "*minor*" and "*insignificant*" *factor*. We quote his testimony from pages 134-135 of the Remington-Martin record as follows:

"Cross-Int. 69. Then, as I understand your answers to the last two questions that I have asked, the flow of the stock is not entirely controlled by gravity; is this a fact?

Ans. In an Eibel installation, the friction of the wire is a minor factor in the acceleration of the stock.

Cross-Int. 70. It is, however, a factor, is it not?

Ans. Yes; but insignificant in comparison with the pitch."

CARTER POINTS OUT GIST OF EIBEL PATENT.

Henry W. Carter, testifying as an expert on behalf of the

defendant, points out the gist of the arrangement set forth in the Eibel patent in suit as follows:

"The gist of the arrangement set forth in the Eibel patent in suit is the pitching of the making wire on the Fourdrinier machine downwardly from the breast-roll toward the guide-roll to a degree such as to accelerate the oncoming stock to the speed of the wire by the action of gravity due to pitch of the wire. The underlying principle involved is that water will run down hill and accelerate as it runs, so that by making the hill steep enough any desired speed of flow may be obtained at any point in the down hill travel. * * * The only two elements involved in the acceleration of the stock, which the Eibel patent discusses, are the friction of the moving wire and the action of gravity due to the pitch of the wire, and as already stated, the gist of the arrangement proposed is one which puts the entire work of accelerating the stock on the action of gravity due to pitch of the wire, thus eliminating the drag of the wire as a factor in the acceleration of the stock to the necessary speed" (Rec., pp. 886-888).

Carter finds further reason, both in the testimony of Aldrich and in the specification of the second patent issued to Eibel at about the same time as the patent in suit, for considering that the Eibel patent specifically requires, for the operation of Fourdrinier machines, and the application of the so-called Eibel principle, that the acceleration of stock to the speed of the wire be brought about solely by gravity due to the pitch of the wire. The second Eibel patent referred to by Carter is No. 851,227 issued April 23rd, 1907, to the plaintiff upon an application filed by Eibel two days after the issue of the patent in suit, and in which reference is made to the patent in suit. In the specification of this patent it is said that with the arrangement shown the stock "will flow into and along the stock reservoir in a shallow stream evenly and uniformly and will maintain a substantially constant level therein. It is not herein intended that the stock shall accumulate in the stock reservoir, to produce a head," etc. (Spec. p. 2, lines 37-48; Rec., p. 1039).

These statements bear out defendant's contention and the

position taken by its experts that the mode of operation of the Eibel patent in suit is to use the smallest possible initial head and to obtain the acceleration of the stock from its low initial speed to speed equality with the wire solely by gravity due to pitch. Eibel here makes it clear that he does not propose to have the stock accumulate in the flow box so as to "produce a head." If there is no head in the flow box the stock must enter upon the wire at a low initial speed the very opposite of defendant's method of employing a high head and a high initial speed to the stock.

Expert Livermore Agrees With Carter that Eibel Patent Requires Elimination of Drag of Wire.

Joseph P. Livermore, also examined as an expert on behalf of the defendant, agrees with Carter that the so-called Eibel principle, as set forth in the patent in suit, is directed to the elimination of the dragging effect of the wire on the stock, and the acceleration of the stock by gravity alone, due to pitch, to bring the stock up to the speed of the wire. Livermore says:

"The essential feature of Eibel's arrangement, as I understand it, is directed to the elimination of this dragging effect of the wire on the stock by causing the action of gravity on the stock to accelerate its speed, so as to bring it to the point of equality, or equilibrium, as the specification says at a comparatively early period in the travel of the wire while the stock is still fluid, so that from that point there would be no such disturbance or waving or rippling as is described, to affect the laying of the fibre detrimentally" (Rec., p. 964).

Plaintiff's Counsel on Former Argument Asserted Speed Equality Obtained by Pitch Alone.

At the argument of the motion for the preliminary injunction in the trial court and on the hearing, in the Circuit Court of Appeals, of the appeal from the order granting the injunction, it was repeatedly asserted by plaintiff's counsel that Eibel gave

the making wire a sharp pitch and *thereby* brought the speed of the stock up to speed equality with the wire by gravity, and it was claimed that this was a brilliant discovery on the part of Eibel. We quote the following from plaintiff's brief (p. 7) in the trial court on the motion for the preliminary injunction:

"Eibel made the discovery *that the reason for this commotion of the stock when high speeds were given to the wire was the difference of speed between the wire and the stock.* This was a brilliant discovery, and Eibel conceived a brilliant method of applying his discovery and remedying the condition, thus doing away with the limit that had previously been set on paper making speed. *He gave the wire a sharp downward pitch from breast-roll to guide-roll, and thus called in the aid of gravitation to speed up the stock on the wire and to bring it up to speed equality with the wire.*"

Counsel upon the same page of their brief defined the Eibel invention as follows:

"This, very briefly stated, is the Eibel invention. It consists in giving to the breast-roll end of the wire a substantial elevation (nothing but a substantial elevation will do for the purpose of the Eibel invention), *whereby the stock is accelerated by gravity up to speed equality with the wire.*"

Again counsel say (p. 10) in the same brief:

"The grade is to be arranged to give a *rapid gravity flow* of the stock, and the machine then speeded up to meet it, the speed being increased as long as the sheet remains smooth."

Defining the invention covered by claim 1 of the Eibel patent, counsel in the same brief (p. 12) say:

"The wire speed and the pitch must be so related, to conform to the claim, that the stock under the influence of gravity is accelerated until it reaches a speed substantially equal to that of the wire."

In claiming that defendant's machines use the Eibel principle, counsel in the same brief (p. 14) say:

"As Aldrich explained (p. 24), in the defendant's machines the acceleration of the stock up to the speed equality with the wire is produced, as in the Eibel patent, primarily

by gravity, due to the pitch of the wires, which causes the stock to travel rapidly in the direction of the movement of the wire, and quickly to attain the wire speed."

This, as we shall point out later in this brief, while being true as a statement of the so-called Eibel principle, is not true as a statement of the operation of defendant's machines.

In the brief filed by counsel in the Court of Appeals in this case (p. 58) it is said:

"Eibel gives his wire a substantial pitch with the result that the stock is given a rapid acceleration under the influence of gravity up to speed equality with the wire."

And again, referring to prior machines, counsel say, on the same page of their brief:

"There was no co-ordination or inter-relation at all between the speed of the wire and the pitch, and the stock was not brought under the influence of the gravity feed up to speed equality with the wire."

In the same brief (p. 69) discussing the form of the Eibel claims, it is said:

"Eibel's invention also included a process, to-wit: the process of making paper by accelerating stock on the wire by gravity due to the inclination of the wire, and running the wire at a speed corresponding to the maximum speed of the accelerated stock, so as to produce substantial speed equality between stock and wire, and the elimination of waves and ripples in the stock. This also was absolutely a new idea, and it was something additional to and different from the mere construction of an Eibel machine, for it involved in addition to the construction and arrangement of the machine, the operation of that machine in a certain definite manner, making the wire speed substantially equal to the speed of the accelerated stock."

Referring to claims 1 and 3 of the patent it is said (p. 70) in the same brief:

"Claims 1 and 3 are process claims, since they are directed at the method of producing paper by speeding the wire at a rate corresponding to the rate of flow of the stock, accelerated under the influence of gravity on a pitched wire."

We submit that these references to the testimony of both plaintiff's and defendant's experts, and to the briefs of plaintiff's counsel, show conclusively, as particularly pointed out by Carter and Livermore, that the "Eibel principle" consists in giving to the making wire of the Fourdrinier machine such a pitch as to cause the stock to be accelerated by gravity alone up to the speed of the making wire.

SAME INTERPRETATION GIVEN TO EIBEL PATENT IN REMINGTON-MARTIN SUIT.

In the Remington-Martin suit it is clear, from Judge Mayer's opinion, that the Eibel principle which was considered to give novelty to the alleged Eibel invention over the prior art, and which was apparently admitted to have been used in defendant's machines in that case, was understood to consist in causing the stock to be accelerated by gravity alone up to the speed of the making wire whereby the drag of the wire as a factor in producing speed equality between the wire and the stock was eliminated. Judge Mayer quoted from the testimony of the expert, Little, the following statement:

"The grade is to be arranged to give a rapid gravity flow of the stock, and the machine then speeded up to meet it as long as the sheet remains smooth."

Judge Mayer also said:

"The practical workers in the art had no difficulty in understanding that the pitch must be higher than three or four inches, and that the pitch of the wire and the wire speed must be so correlated *that gravity will accelerate the stock to speed equality with the wire*" (234 Fed. 632. Italics ours).

PLAINTIFF'S EXPERT TESTIFIED IN REMINGTON-MARTIN SUIT DRAG OF WIRE IN EIBEL INSIGNIFICANT.

We have already called attention to the fact that plaintiff's expert, Aldrich, testifying in the Remington-Martin suit,

has stated that in an Eibel installation the friction of the wire is a minor factor in the acceleration of the stock, and that the drag of the wire is an "*insignificant*" factor in accelerating the stock to speed equality with the wire in comparison with the accelerating effect produced by the pitch of the wire.

This statement is entirely consistent with the Eibel specification and claims, which we have hereinbefore discussed, and it was undoubtedly the view of plaintiff's counsel and of the Court of Appeals of the Second Circuit in the Remington-Martin suit. It was not until defendant's experts in this case, Prof. Allen, and Messrs. Carter and Livermore, pointed out the law of physics by which the speed of the stock under any given head and pitch of wire, is to be determined, and showed, beyond question, that in the operation of defendant's machines the drag of the wire is a greater factor in bringing about speed equality between stock and wire than is the pitch of the wire itself, that counsel for plaintiff found it necessary to take a new position in reference to the Eibel patent and to ask a new interpretation of its specification and claims.

It is now argued that the Eibel principle is used if gravity due to pitch is employed, to any extent, even as a minor factor in accelerating the stock to speed equality with the wire. And even if gravity, due to pitch, is a smaller factor than the drag of the wire, in accelerating the stock, it is asserted that the Eibel invention is used if *any advantage*, in accelerating the stock, is obtained by the gravity feed due to the pitch of the wire.

This is made clear by the testimony of plaintiff's expert, Aldrich, in rebuttal. Defendant had shown that with its No. 2 machine, as the same has been operated since August, 1917, the gravity feed due to the pitch of the wire, is a factor in bringing about speed equality between stock and wire to the extent of only 11% of the actual speed of the stock at the point where speed equality is brought about. That substantially

56% of the speed is due to the initial velocity of the stock, and the balance, substantially 33%, is due to the drag of the wire.

Yet with these facts before him, and notwithstanding his testimony in the Remington-Martin suit to the effect that in an Eibel installation the drag of the wire is an insignificant factor, in bringing about speed equality between stock and wire, and his testimony in this case that in any Eibel installation the gravity due to pitch of the wire must be the predominating factor in bringing about such speed equality, Mr. Aldrich testified in rebuttal as follows:

"I consider that it (defendant's No. 2 machine) is receiving substantial help from what is revealed in the Eibel specification, running considerably faster than would otherwise be possible, but that the wire is being called upon to do more work of acceleration than it is well adapted to do and at a sacrifice of the quality of the sheet" (Rec., p. 152).

Aldrich further testified referring to the No. 2 machine that "there is no question in my mind but what the Eibel invention was employed" (Rec., p. 152).

It is, therefore, seen that Mr. Aldrich now abandons the position taken by him in the Remington-Martin case, that the acceleration due to drag of the wire in an Eibel installation, must be *insignificant*, and asserts that a machine operated like defendant's No. 2 machine, wherein one-third of the acceleration of the stock is brought about by the drag of the wire, and only about one-tenth by the pitch of the wire, the balance being obtained from the initial speed of the stock, due to the head in the flow box, is an infringement of the Eibel patent and uses the Eibel invention.

We submit that this is a material shifting from plaintiff's position in the Remington-Martin case; that it is a direct departure from the disclosure of the Eibel specification and claims; that if this position had been taken in the Remington-Martin suit, and it had been there claimed that the Eibel patent was to be construed as covering any machine in which the

pitch of the wire contributed as little as 11% to the acceleration of the stock, the decision of the Court of Appeals of the Second Circuit would have been against the validity of the Eibel patent.

PLAINTIFF'S EXPERT ORIGINALLY TESTIFIED IN EIBEL INSTALLATION GRAVITY DUE TO PITCH OF WIRE IS PREDOMINATING FACTOR IN PRODUCING SPEED EQUALITY.

We have already called attention to the fact that in the original testimony in this suit of plaintiff's expert, Aldrich, it was repeatedly asserted that in the Eibel process the gravity feed of the stock, due to the pitch of the wire, is the "*predominating factor*" in bringing about speed equality between stock and wire. This statement merely supplements the testimony of the same expert that, in an Eibel installation, the drag of the wire, as a factor in bringing about speed equality between stock and wire, is *insignificant*.

Defendant's witnesses Carter and Livermore having shown by testimony that cannot be questioned, that in defendant's machines, as originally operated, gravity feed due to pitch of wire is a factor only to the extent of one-fifth, or 20%, in bringing about such speed equality, and that in defendant's No. 2 machine the gravity speed, due to pitch, is a factor, in bringing about such speed equality, only to the extent of about one-tenth or 11%, Aldrich is forced to abandon his former position, and now contends that the Eibel invention is employed if gravity due to pitch is a factor to any extent in bringing about speed equality, even though it is a very minor factor, as in defendant's No. 2 machine, effecting only 11% of the total speed of the stock.

These later positions of plaintiff's expert are so inconsistent with his former testimony, with the disclosures of the Eibel patent, and with the record and decision in the Remington-

Martin suit, and are so obviously assumed with the hope of distorting the specification and claims of the Eibel patent into covering, defendant's machines, as, in our judgment, to render the testimony of this expert entirely valueless.

THE CLAIMS OF THE PATENT IN SUIT.

The claims of the Eibel patent in suit read as follows:

1. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a substantial elevation above the level, *whereby the stock is caused to travel by gravity, rapidly, in the direction of movement of the wire, and at a speed approximately equal to the speed of the wire*, substantially as described.

2. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a high elevation, *whereby the stock is caused to travel by gravity faster than the normal speed of the wire* for a certain grade of stock, and having means for increasing the speed of the machine to *cause the wire to travel at substantially the same rate of speed as the rapidly moving stock, substantially as described.*

3. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, the breast-roll end of the wire being maintained at a substantial elevation above the level, whereby the stock *is caused to travel by gravity, rapidly, in the direction of movement of the wire and at a speed approximately equal to the speed of the wire*, substantially as described.

7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction boxes supported at a corresponding declination, substantially as described.

8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction boxes arranged at different elevations, substantially as described.

12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated *that the velocity of the stock down the declining wire, caused by gravity*, is so related to the velocity of the wire in the same direction that waves and ripples on the stock are substantially avoided and the fibres deposited with substantial uniformity on the wire, substantially as described. (Italics ours.)

It will be seen that the language of claims 1, 2, 3 and 12, above quoted is entirely consistent with the specification of the Eibel patent and that this language is not consistent with any interpretation of the *patent except that interpretation* requiring the travel of the stock to be brought to equality with the travel of the wire by gravity due to pitch alone.

IV.

EIBEL PATENT TESTED BY CARTER DIAGRAMS.

The Terms "Total Pitch" and "Net Pitch."

It will be noted that Carter in his testimony, and on the diagrams produced by him, to which we shall refer, has used the terms "total pitch" and "net pitch." The term "total pitch" refers to the amount that the breast-roll end of the making wire is elevated above the guide-roll. In other words, it is the total inclination of the making wire. As, however, the stock becomes attached to and travels with the wire at some point between the breast-roll and the suction boxes, which has been fixed by plaintiff's expert, corroborated by defendant's expert, as about one-third of the way down from the breast-roll to the guide-roll, the inclination of the wire, after speed equality between the stock and the wire has been reached, has no effect whatever. It is the amount of pitch between the breast-roll and the point where speed equality between stock and wire is obtained that has any effect in the operation of the machine.

All of the experts agree that the inclination of the wire below the point where equality of speed between the stock and wire is reached, has no effect in the operation of the machine; that the inclination is continued beyond this point merely as a matter of convenience. Plaintiff's expert, Aldrich, on direct examination in rebuttal (Rec., p. 124), makes this point clear:

"Q24. On those stages of the wire after formation is practically complete does it make any difference whether the wire is pitched or not?

A. I would say not; there is no necessity of pitching the wire all the way to the guide-roll except as a matter of convenience, and because it is difficult to do otherwise."

In a machine, therefore, like the defendant's, having a distance of substantially 29 feet between the breast-roll and the guide-roll, and with the breast-roll raised above the guide-roll a distance of 13½ inches, the effective pitch or "net pitch," to use Carter's expression, will be substantially 4½ inches, for the reason that this is the amount of pitch between the breast-roll and the point where the stock attains speed equality and adheres to the wire which plaintiff's witnesses fix at "about 9 or 10 feet from the slice" (Aldrich, Rec., pp. 31 and 48). As this is about one-third of the distance from the breast-roll to the guide-roll the net pitch, or pitch between the breast-roll and the point of speed equality, is substantially one-third of the total pitch. This means that, in defendant's machines having a total pitch of 13½ inches, the effective, or net pitch, which is employed in assisting the bringing of the stock up to speed equality with the wire, is about 4½ inches.

EIBEL PRINCIPLE ILLUSTRATED BY CARTER DIAGRAMS NOS. 1 AND 1-A, SHEET NO. 1.

As we have pointed out, the so-called Eibel principle, as disclosed in the patent in suit, requires the making wire of a Fourdrinier machine to be given a sufficient pitch so that the stock will be accelerated by gravity, due to the pitch of the wire, and brought to the desired speed at a comparatively early period in the travel of the wire, and the wire then speeded up to equality with the speed of the stock. We think there can be no difference of opinion as to this being an accurate statement of the so-called Eibel principle.

To illustrate this principle Carter has prepared the Carter Diagrams No. 1 and No. 1-A, Sheet No. 1. Defendant's Ex-

hibit W (Rec., following p. 1092; Sheet 161). The first diagram is designated as follows:

"Diagram No. 1 Showing Actual Pitch Necessary to Mode of Operation Set Forth in Eibel Patent in Suit in Order to Produce Speed Equality of Stock and Wire at a Point 9 to 10 ft. from Slice, Using a 70 ft. Wire Running at Approximately 585 ft. Per Minute. Total Pitch, 54 inches. Net Pitch, 18 inches."

Carter has explained in his testimony (Rec., Carter Qs9-20: pp. 888-892), that to obtain the Eibel principle of operation whereby gravity due to pitch alone is caused to accelerate the speed of the stock to the speed of the wire, in a machine having a 70-foot wire and running approximately 600 feet per minute, it will be necessary to give the breast-roll end of the wire an elevation of 54 inches above the glide-roll, if head is ignored entirely, and an elevation of 48 inches if a head of about 2¼ inches is assumed to be employed, which according to plaintiff's expert, Aldrich, is the head that was in common use prior to the date of the Eibel patent.

Carter has also produced upon Sheet 1, Diagram No. 1-A (Rec., Exhibit W, following p. 1092; Sheet 161), which is designated as follows:

"Diagram No. 1-A Reproducing Pitch Shown in Drawing of Eibel Patent in Suit, Assuming 70 ft. wire Running 585 ft. per minute. At a Point 9½ ft. from slice the speed of stock under the Action of Gravity Due to the Pitch of the Wire would be only 276 feet Per Minute or Less than Half the Speed of Wire. Total Pitch 12 in. Net Pitch 4 in. to Point 9½ ft. from Slice."

Carter has also in his testimony explained Diagram No. 1-A, which reproduces the amount of pitch shown in the drawing of the Eibel patent in suit. This Diagram demonstrates that with the amount of pitch here shown, with a 70-foot wire running at 585 feet per minute, the speed of the stock under the action of gravity, due to the pitch of the wire, will be only 276 feet per minute, or less than one-half the speed of the wire (Rec., Carter Qs21-25, pp. 892-894).

If the Eibel principle is employed and the pitch of the wire alone is used to bring the stock up to speed equality with the wire at a point substantially 10 feet from the head of the wire, then, as illustrated by the Carter Diagram No. 1, a total pitch of 54 inches, or a net pitch of 18 inches, must be provided. If the stock is assumed to enter upon the wire under a head of 2¼ inches, or at an initial speed of 200 ft. per minute, which, according to the testimony of Aldrich, was a common pitch at the time of the alleged Eibel invention, and possibly what Eibel contemplated using ,then the total pitch required to bring about speed equality between stock and wire, at a point one-third the distance down the wire, will be 48 inches, and the effective or net pitch 16 inches. As pointed out by Carter (Rec., p. 895), and by Livermore (Rec., pp. 965-966) as it is not practicable to flow the stock onto the wire except with some initial speed, it is fair to assume that Eibel contemplated the use of a low head, which might give the initial speed of 200 feet per minute, which is the speed referred to by Aldrich in explaining the operation of the Eibel patent (Rec., p. 16). When asked which he thought would be better to use a head of more or less than five or six inches, Aldrich replied:

"I would say a low head, which gives a slower, thicker stream of stock upon the wire" (Rec., pp. 47-48).

And Carter testified:

"I find it difficult to conceive of a situation in which the stock could be flowed on the upper end of the wire at actually no head at all or zero velocity. The very fact of supplying the liquid stock to the wire seems to inherently require, as a matter of practice, some velocity in its approach; but I regard is as clear from the patent that Eibel contemplates a condition in which the stock is supplied at as nearly no head at all, i. e., as nearly zero velocity as can be attained by practice" (Rec., p. 895).

Plaintiff's Criticism of Carter Diagrams.

In the argument in the court below, plaintiff indulged in considerable criticism of what was referred to as "Carter's

Mathematical Argument," and spoke very disparagingly of Carter's qualifications as an expert, and challenged the correctness of the figures upon which his calculations were based. Carter has, however, simply applied, to the machines in question, universally accepted engineering formulas to determine the speed of liquids flowing under given heads. These tables are found in every engineer's hand-book, and they are in daily use by engineers everywhere. Carter makes no computations, but simply applies the established figures, for such speeds, to the liquid stock flowing over the making wire. The accuracy of Carter's statements are attested by Livermore, and the correctness of the tables used are testified to by Prof. Allen of the Worcester Polytechnic Institute.

In fact Aldrich, plaintiff's expert does not question the accuracy of Carter's method of ascertaining the speed of the stock due to head and pitch, at any given point upon the making wire. He could not well do so because Aldrich adopts the same method exactly when he figures, as he did in the Remington-Martin case, and as he has done in this case, that a two-and-a-quarter inch head, in the flow box of a Fourdrinier machine, will cause the stock to pass on to the making wire at an initial velocity of 200 feet per minute. Carter and Livermore simply apply the same tables to show what the speed of the stock will be at a point on the wire, where Carter found, in the machines examined by him, that the sheet had smoothed out, showing that speed equality, between wire and stock, had been obtained.

THEORY OF EIBEL PATENT NOT BORNE OUT BY OPERATION OF MACHINE ILLUSTRATED.

Carter does not testify that the theory or mode of operation described in the Eibel patent is incapable of being carried out in a Fourdrinier machine, but both Carter and Livermore agree that this theory, or mode of operation, will not be

carried out by a machine having its parts proportioned in accordance with the drawing shown in the Eibel patent. Nor will such mode of operation be carried out by any one of the defendant's machines, nor by any one of the prior art machines referred to in this record.

Up to the time Carter testified in this case and analyzed the operation of the several machines in controversy, it had been assumed by plaintiff's counsel and by plaintiff's expert, as was apparently done by everybody connected with the Remington-Martin case, including court and counsel, that a machine having the pitch illustrated in the drawings of the Eibel patent, or the pitch used in defendant's machines, did actually operate in accordance with the theory set forth in the specification and claims of the Eibel patent.

In other words it was assumed that with this amount of pitch in a Fourdrinier machine, having its making wire running at anywhere above 400 feet per minute, the stock would be accelerated to the speed of the wire by gravity feed due to pitch of the wire, and that the drag of the wire would be practically eliminated.

Plaintiff's expert made this clear, in his testimony, when he stated that in an Eibel installation the drag of the wire would be "insignificant" as a factor in bringing the stock up to speed equality as compared with the pitch. The same witness further emphasized this fact by stating that in any Eibel installation the "*pitch is the predominating factor in getting the stock as it issues upon the wire to the speed of the wire*" (Rec., p. 44; XQ64).

Now, Carter comes along and by applying to a Fourdrinier machine the same gravity rule that plaintiff's expert applies to determine that with a head of two-and-a-quarter inches in the flow box, the stock will enter upon the wire at a speed of 200 feet per minute, shows that in Fourdrinier machines, such for instance as defendant's, the preponderat-

ing factor in bringing the stock to speed equality with the wire, is the head in the flow box, which is very much higher than Eibel evidently contemplated using, and very much higher than Aldrich assumed to be possible in explaining the Eibel invention in the Remington-Martin case, and in his deposition in chief in this case. Carter shows, and he is fully corroborated by Livermore, and not contradicted by Aldrich, that in all of defendant's machines gravity due to the pitch of the wire is a very minor factor in bringing about speed equality between stock and wire; that it is not the predominating factor at all, as Aldrich had testified such pitch must be in any Eibel installation. Again, Carter and Livermore both agree that in defendant's machines the drag of the wire is not a minor or insignificant factor in bringing the stock up to speed equality with the wire, but that it is a very material factor, and in fact in defendant's 1, 3 and 4 machines, as defendant's witnesses show they are universally operated, the drag of the wire is a considerably larger factor in securing speed equality between stock and wire, than is the gravity feed due to pitch, and that, in defendant's No. 2 machine, the drag of the wire has more than double the effect of the gravity feed, due to pitch, in bringing the stock up to speed equality with the wire. In fact, as Carter and Livermore both agree, in defendant's machines 1, 3 and 4, the gravity feed due to pitch produces only one-fifth, or 20%, of the acceleration of the stock, leaving four-fifths, or 80%, to be produced by the initial head of the stock in the flow box, and the drag of the wire, while in defendant's machine No. 2 the effect of pitch is only 11%, leaving 89%, or nearly nine-tenths, of the effect in bringing the stock to speed equality with the wire to be produced by the initial head and the drag of the wire.

INCREASE OF ONE INCH IN HEAD EQUAL TO INCREASE OF THREE INCHES IN PITCH.

We think we have made it clear that to employ the Eibel patent, which announces what was claimed to be a "new principle of operation," speed equality between the stock and the wire must be brought about either by gravity alone due to the pitch of the wire, or, at least, gravity due to the pitch of the wire, must be the "*preponderating factor*" in securing such speed equality; and acceleration, due to the drag of the wire, must, as Aldrich has testified, be "*insignificant*," or negligible.

It is to be noted in this connection that a slight increase in the head makes a decided decrease in the pitch of wire necessary to bring about speed equality between the stock and wire at the desired point.

For example, an increase of one inch in the head at the flow box, has the same effect in raising the speed of the stock at a point on the wire one-third of the distance from the breast-roll towards the guide-roll, as increasing the pitch of the wire three inches. In other words every inch of raise of head in the flow box is equal to an increase of three inches in the pitch of the making wire. Raising the head in the flow box from two-and-a-quarter inches, which Aldrich seems to consider as a practicable limit of head to be used with an Eibel installation, to eight inches, which plaintiff claims was employed on defendant's machine when examined by its expert, secures the same acceleration of speed of the stock at a point one-third the distance down the wire from the flow box, as would be obtained by giving the making wire a pitch of eighteen inches.

A seventy foot wire having a three-inch incline or pitch, and an eight-inch head in the flow box, such as used prior to Eibel in the Bagley & Sewall machines, produces almost identically the same speed of stock at a point ten feet from the flow box, as is obtained with a two-and-a-quarter-inch head, and a twenty-

one-inch pitch of the making wire.

Aldrich repeatedly states, however, that the Eibel principle has nothing to do with the initial head. He concedes that if speed equality of stock and wire is produced by the initial head alone, or by the initial head and the drag of the wire, the Eibel principle is not employed. The Eibel principle, as set forth in the specification of the Eibel patent is only employed, as has been made clear by defendant's experts Carter and Livermore, when the speed equality of stock and wire is brought about by gravity alone, due to the pitch of the wire. Aldrich, plaintiff's expert, practically concedes this when he testifies that in an Eibel installation the gravity feed due to the pitch of the wire must be the "preponderating" factor in bringing about such speed equality, and that the influence due to drag of wire must be "insignificant."

It was this alleged new principle of securing speed equality between stock and wire, by gravity due to the pitch of the wire, thus eliminating the drag of the wire or making its influence "insignificant," to quote Aldrich, that was urged upon the lower courts at the former hearings, as a great discovery upon the part of Eibel, and which was urged upon the Circuit Court of Appeals of the Second Circuit, and was held by it to distinguish the alleged Eibel invention from the operation of machines of the prior art, thereby causing that court to sustain claims 1, 2 and 3 of the Eibel patent. It held these claims to be infringed by the Remington-Martin machine, as it was nowhere suggested, in that case, that gravity, due to pitch of the wire, was not either the sole, or, at least, the preponderating factor in bringing about speed equality between the stock and the wire, the drag of the wire being asserted to be "insignificant." Plaintiff's witnesses in that case asserted that this was the operation of the Remington-Martin machines, and the defendant nowhere questioned this claim. The evidence in the present case, however, shows conclusively that in defendant's machine

gravity due to pitch is only a minor factor in bringing about the speed equality between stock and wire. Hence plaintiff is forced to take a new position in reference to the so-called Eibel principle, and to now assert that while defendant employs a "high head" and "drag of the wire" to accomplish 80% to 90% of the necessary acceleration of the stock to speed equality with the wire, it is using the Eibel principle by supplementing, or superimposing upon, these factors of "high head" and "Drag of wire" an acceleration due to pitch of 20%, or even as little as 10%.

V.

EVIDENCE RESPECTING OPERATION OF DEFENDANT'S MACHINES.

The Operation of Defendant's Machines.

The defendant in this case, as shown by the proofs, owns and operates in its paper mill at International Falls, Minnesota, four Fourdrinier machines of the Pusey & Jones type. Machines 1 and 2 have making wires one hundred and fifty-four inches wide, and machines 3 and 4 have making wires one hundred and eighty-four inches wide. On all of the machines the wires are seventy feet long. All of the wires are inclined downward from the top of the breast-roll to the top of the guide-roll. Plaintiff as a part of its *prima facie* proofs produced the affidavit of Patrick Gray, which had been filed in support of the motion for a preliminary injunction. It was stipulated that if Gray were called as a witness he would testify in accordance with the affidavit. The stipulated affidavit is found upon pages 9 and 10 of the record. As to the pitch of the wire, the amount of head, and the speed of the machine, Gray's testimony is as follows:

"On the No. 4 machine the top of the breast-roll was between 14 and 15 inches higher than the top of the guide-roll; this

height is called the 'pitch' of the wire. On all the other machines the pitch of the wire was substantially the same, that is, between 14 and 15 inches.

The depth of the pond on all these machines at the slice was between six or eight inches.

The speed of the machine on the two smaller machines was about 600 feet per minute, and on the two large machines it was nearly the same" (Rec., p. 9).

Gray did not profess to have measured any of these dimensions, and the figures given by him are not accurate.

As shown by the testimony of defendant's witness, Cone Barlow, the total pitch of defendant's machines on May 4th, 1917, was thirteen and one-fourth inches. The speed of the wire was 585 f.p.m. and the paper speed was 624 f.p.m. (Rec., pp. 2-14).

John A. Devine called as a witness by defendant testified, on May 25th, 1917, that the head carried on the defendant's machines at International Falls, "is about six inches—six to eight" (Rec., p. 237).

Drawings of the defendant's machines, produced by the witness Barlow showing the details of the arrangement of the parts, and the inclination of the wire and frame, are in evidence as "Defendant's Exhibits A and D" (Rec., following p. 1085; sheets 127-131). Defendant's expert, Carter, examined defendant's machines in November, 1917, and made careful measurements of the same. Carter's figures on these measurements are practically identical with those furnished by Barlow (Rec., pp. 899-901). Plaintiff called Aldrich, in rebuttal, who testified that he had examined defendant's machine on September 13th, 1919, and he found that the head on the No. 1 machine was 7⅞ inches; that the wire speed was 572 feet per minute, and the paper speed 622 feet per minute. In other words, Aldrich found the wire speed to be 13 feet per minute less than Barlow and Carter. This difference is accounted for by the fact that Aldrich took the count of the revolutions of the lower couch-roll, which drives the making wire, and which is 28 inches in

diameter, at 78 r.p.m. while the witnesses Barlow and Carter both counted this at 80 revolutions per minute. Obviously both counts may have been correct, as defendant's foreman Haddock, called as a witness by plaintiff on the day Aldrich examined the machines, testified that "all the machines slowed down last week" (Rec., p. 96), although Haddock also testified that he thought he had a count of 79 for that day.

The normal wire speed of defendant's machines appears, therefore, to be 585 feet per minute.

Defendant's machines also run normally with a head of 6 inches, though this is undoubtedly varied sometimes to as high as eight inches (Rec., p. 95).

DEFENDANT'S NO. 2 MACHINE.

For the purpose of ascertaining what the effect would be of operating defendant's machines at a lower pitch defendant's machine No. 2, on April 8th, 1917, had its pitch lowered to six inches, or a little less (Rec., Barlow, pp. 221-222; Devine, p. 236; Beyerl, p. 259; LaValley, p. 81; Bellile, p. 88, Haddock, p. 92).

This machine was run for a few weeks with the six-inch pitch, and then in July, 1917, at the request of Haddock, at the time he was made day foreman, it was put back to the original pitch of 13½ inches. A few weeks later it was again put down to the six-inch pitch and has remained at that pitch ever since (Rec., pp. 80-101).

The No. 2 machine with the six-inch pitch has run at the same speed as the other machines and with substantially the same head, though the head has been at times a little higher (Rec., p. 237; LaValley, pp. 83-84; Haddock, p. 95).

The production sheets are in evidence as "Defendant's Exhibit G" (Beyerl, Rec., p. 260), together with the production sheets offered as a part of defendant's sur-rebuttal proofs (see affidavit

of L. G. Wilson, Rec., pp. 1001-1003).

Taking the total production for all of the period from April, 1916, to May, 1920, both inclusive, we find that the No. 2 machine has made 54,855.295 tons as compared with 55,368.002 made in the same period on the No. 1 machine, or 512 tons in favor of the No. 1 machine. Since July, 1918, the monthly production of the No. 2 machine has usually been in excess of the monthly production of the No. 1 machine.

Not only has the No. 2 machine, since it has been given the six-inch pitch, made practically as much paper as the duplicate No. 1 machine, with the thirteen-and-one-half-inch pitch, but the testimony shows that the machine gives less trouble with the lower pitch and produces stronger paper. This appears from the testimony of defendant's foreman, Haddock, called as a witness by the plaintiff (Rec., Qs48-64, 81-98, pp. 95-101).

A six-inch pitch is, therefore, conclusively demonstrated to be as good in every particular as a pitch of 13½ inches. With the lower pitch a paper machine can be run at 620 feet per minute, making just as much paper as a machine of the same width having a 13½-inch pitch and running at the same speed, and the lower machine produces stronger paper, and gives less trouble in the way of breakages, etc. The fact that the paper made on the machine with the lower pitch looks a little "more open" or "wilder" cuts no figure whatever as long as it has as much, or more, strength and sells for the same price.

District Court Did Not Pass on No. 2 Machine.

While plaintiff's expert has asserted throughout this case that any machine having a five-inch pitch is an infringement of the Eibel patent, as we have already pointed out, and has also asserted that defendant's No. 2 machine is an infringement because it gets some benefit from a pitched wire, and while plaintiff's counsel in their brief in the trial court asserted that

the No. 2 machine is an infringement, it would appear that counsel hardly dared to ask the court to hold in this case that the No. 2 machine is an infringement of the Eibel patent, while its own expert was on record as admitting that machines with four-inch pitches were found in the prior art.

Counsel, therefore, suggested to the trial court that as defendant had adopted the six-inch pitch for the No. 2 machine subsequent to the beginning of this suit, it was not necessary to pass upon the question of infringement by the No. 2 machine with the six-inch pitch (Plaintiff's Brief in Dist. Court, p. 89).

In other words plaintiff suggested that the court leave undetermined what is meant by a "substantial" pitch in the Eibel patent. Its own expert has said that a five-inch pitch is a "substantial" pitch within the meaning of the Eibel patent, and that a four-inch pitch is not a "substantial" pitch, not because a four-inch pitch and a five-inch pitch act any differently in the machine, but because Eibel knew that the four-inch pitch was old and "sought to differentiate the pitch he has in mind and what had been previously used."

The trial court thereupon adopted this plan, saying:

"In the present aspect of the case, I think it unnecessary to decide whether or not the use of the smaller pitch in the No. 2 machine is or is not an infringement" (267 Fed., p. 855).

Defendant submits, however, in this connection that plaintiff cannot in this court claim that defendant's No. 2 machine, with a six-inch pitch, is an infringement of the Eibel patent, and that, as stated by its expert in the testimony we have already quoted, a substantial pitch in the meaning of the Eibel patent is a pitch of five inches or more without at the same time having this court determine the question of patentability by a comparison of the five-inch pitch, which it asserts to be within the Eibel claims, and the four-inch pitch, which plain-

tiff's expert admits is prior art. Plaintiff cannot, by asking the court not to determine in this suit whether plaintiff's No. 2 machine with a six-inch pitch is an infringement of the Eibel patent, escape a comparison on the questions of novelty, invention and patentability, between the lowest pitch—five inches—which it asserts to be within the scope of the Eibel claims, and the highest pitch—four inches—which its expert admits was in use before Eibel.

COURT OF APPEALS HOLDS NECESSARY TO DETERMINE AMOUNT OF PITCH COVERED BY EIBEL PATENT.

The Court of Appeals accepts defendant's contention that it is necessary in this case to determine whether the use of the smaller pitch in the No. 2 machine is or is not an infringement. We quote the following from the opinion of the court:

"The question of the amount of pitch covered by the Eibel patent is no mere academic problem. It is vital, and of money importance in this litigation. No decree for an accounting adequate to guide a master can be framed without deciding whether a 6-inch pitch is Eibel's or the public's. After the filing of the bill on January 1, 1917, defendant reduced the pitch on its No. 2 machine from 14 or 16 inches to 6 or 6½ inches, and has so operated it during most of these four intervening years. Judge Hale, at the suggestion of plaintiff's counsel, did not decide whether the use of the smaller pitch in the No. 2 machine is or is not an infringement. 267 Fed. 855. But it must be determined in this case whether such use is an infringement,—to be paid for,—or the use of a common right. Plaintiff's contention that this pitch 'is fairly close to the border line' and that the defendant 'could have avoided any possibility of infringement by putting the wire flat' is unsound. Defendant was not required to avoid mere possibilities of infringement; it was entitled to all uses of its own machine not particularly pointed out and distinctly claimed in Eibel's patent. It will not do to assert, as plaintiff does, that 12-inch pitches are substantial and that 3 or 4-inch pitches (prior art) are negligible, leaving intervening pitches in limbo; a line must be drawn available practically, if not mathematically. The case is thus plainly distinguished from such cases

as *Vacuum Cleaner Co. v. A. Rot. Valve Co.*, 227 Fed. 998, and 239 Fed. 544, and *Carnegie Steel Co. v. Cambria Iron Co.*, 185 U. S. 403, and other cases cited by plaintiff on the question of indefiniteness; in all those cases a practically definite limit was stated. In the Eibel patent we find no such limit.

The position learned counsel for the plaintiff are forced to take on this point but illustrate in striking form the otherwise perfectly clear proposition that the Eibel patent is nothing but an attempt to monopolize a difference in degree; that it is only a claim of an improvement in the method of adjusting and operating the machine so indefinite that its own proponents cannot state its limit.

The defendant's experiment in operating this No. 2 machine with the pitch reduced from 14 or 16 inches to 6 or 6½ inches further illustrates the fact that the whole problem is not only one of degree, but of constant adjustment of the operating forces in the machine to different qualities of stock. It appears that this No. 2 machine, operated for a long period with a 6-inch pitch, has produced substantially as much paper, of a stronger fabric, and with less operating trouble, than its duplicate No. 1 machine with about a 13½-inch pitch. The evidence does indicate that the paper produced on the No. 2 machine looks a little 'wilder'; but, tested by the tests alleged to be more important, it is contended to be at least as good paper as that produced on the No. 1 machine. Both machines were operated with substantially the same head, although at times the head of the No. 2 machine is said to have been a little higher.

In the light of this evidence, we find it impossible to hold that the difference between a 6-inch pitch and a 14 to 16-inch pitch causes,—other operating conditions being perhaps slightly varied,—the production of anything other than a slight difference in the look or quality of the paper. At any rate, it does not clearly appear that the additional pitch of 6 or 7 inches, contended by the plaintiff to be a substantial pitch, is an important, or even material, factor in enabling the machine to be operated at a greater speed with the production of a superior quality of paper.

But whether a pitch of 14 inches does or does not produce more or better paper than a pitch of 6 inches, we think it clear that paper-makers are entitled to interchange pitch with head or with drag, and to vary pitch or head in accordance with such judgment, as, dealing with any quality of stock or any capacity of machine, they form, through the experimental processes constantly used by operators, in so adjusting their

machinery as to produce the largest amount and the highest quality of paper" (Rec., p. 202).

EXPERTS CARTER AND LIVERMORE AGREE THAT DEFENDANT'S MACHINES DO NOT EMPLOY THE SO-CALLED EIBEL PRINCIPLE.

We have shown that the so-called Eibel principle requires the making wire to be given sufficient inclination so that the stock, by gravity, will be accelerated to the same speed as the wire. In other words the Eibel principle requires a sufficient inclination to the making wire to cause gravity, due to pitch, to bring about speed equality between the stock and the making wire.

It is confidently asserted that this is not done on any of defendant's machines. It is not done on defendant's machines 1, 3 and 4, having the 13½-inch pitch, and it certainly is not done on the No. 2 machine having the six-inch pitch.

Both defendant's experts, Carter and Livermore, have covered this point fully in their testimony, and both agree that none of defendant's machines operate in accordance with the Eibel principle, or employ the method of operation or structure pointed out in Eibel claims 1, 3, 4 and 12.

Carter, defendant's expert, has produced a sheet of diagrams marked "Carter Diagrams, Sheet No. 1-A," in which he has illustrated the operation of defendant's machines, whether operated as described by plaintiff's witness, Gray, or as described by defendant's witnesses, and seen by Carter in November, 1917. Diagram No. 2 illustrates the operation of defendant's machines, assuming that they are operated as explained by the witness, Gray. Diagram No. 3 represents defendant's machines Nos. 1, 3 and 4, as the witness, Carter, saw them in November, 1917. We call particular attention to Carter's testimony, respecting the operation of defendant's machines, in comparison with the Eibel patent, and as represented by the

Carter Diagram No. 2 and No. 3 (Rec., Carter, Qs36-42, pp. 898-904).

Defendant's expert, Livermore, fully agrees with Carter, in his statement that none of the defendant's machines make use of the Eibel principle (Rec., Livermore, Q21, pp. 968-971).

Carter has pointed out that defendant's machine No. 2, as it has been operated according to the testimony of witnesses since the summer of 1917, departs even farther from the so-called Eibel principle. We quote Carter's testimony in respect to this machine as follows:

"Q38. Please explain what is represented by Diagram No. 4 on this same sheet.

A. Diagram No. 4 on this same sheet, 'Carter Diagrams, Sheet No. 1-A,' is laid out to represent the conditions which obtained on defendant's No. 2 machine as I observed it last November. This machine had been lowered somewhat at its breast-roll end so that the total pitch, instead of being 13½ inches, as in the case of the machines Nos. 1, 3 and 4, is 6 inches, making a net pitch to a point approximately one-third down the wire of a little over 2 inches. The head taken in this case is 6 inches, and the point of speed equality is still approximately one-third down the wire—near enough to that fraction for the purposes of our computations. Actually, the point of speed equality seemed to be a trifle farther from the slice than in the case of defendant's Nos. 1, 3 and 4 machines. That is to say, the point of smooth-out, or the point where the stock reaches the velocity of the wire, seemed to be, perhaps, a foot farther along, or from 10 to 11 feet from the slice, instead of 9 to 10 feet from the slice. I have labeled this diagram:

> 'Diagram No. 4. Defendant's No. 2 machine (now). Head 6 inches; speed of wire, 585 feet per minute; point of speed equality of wire and stock 10-11 feet from slice; total pitch 6 inches; nee pitch 2⅛ inches.'

Under these conditions, I have figured that, of the total acceleration of 585 feet per minute which is given to the stock in order to bring it up to the speed of the wire at the point of speed equality approximately one-third down the wire, something over one-half, that is, 330 feet per minute, results directly from the head in the flow box, this factor being the same as in the case of Diagram No. 2. I have figured that part of the velocity due to the pitch of the wire at 65 feet per minute, and

the balance of the velocity due to the drag of the wire as 190 feet per minute. The percentage of the total velocity or acceleration of the stock which results from the pitch of the wire figures 11 per cent, or slightly more than one-tenth of the total acceleration" (Rec., pp. 900-901).

PLAINTIFF'S EXPERT ORIGINALLY ASSERTED STOCK ACCELERATED TO SPEED OF WIRE, IN DEFENDANT'S MACHINES, BY GRAVITY DUE TO PITCH.

When plaintiff's expert, Aldrich, was originally on the stand in this case, he asserted in positive terms that in defendant's machines the stock was brought up to speed equality with the wire, primarily by gravity, due to the pitch of the wire (Rec., p. 33; Carter, Qs39-41, Rec., pp. 901-903).

ALDRICH IN REBUTTAL CONCEDES DEFENDANT'S POSITION.

As we have seen, when Aldrich gave his first deposition in this case, he assumed that defendant's machines used a wire speed of 550 feet per minute, basing this assumption on the testimony of the witness, Gray, who fixed the paper speed of defendant's machines at about 600 feet per minute. Aldrich then assigned the entire task of bringing the stock from the initial speed due to the head up to the speed of the wire to gravity due to the pitch of the wire. He stated that the high elevation of the wire in defendant's machines causes the stock to travel by gravity something like 145 feet per minute faster than the normal speed, which he had previously placed at 405 feet per minute. In other words, his statement is that the high elevation of the wire in defendant's machines causes the stock to travel by gravity at a speed of 550 feet per minute. Carter has pointed out that this is incorrect (Rec., p. 903), and Livermore agrees with Carter (Rec., p. 970).

In rebuttal Aldrich is forced to concede, in effect, that his original statement is incorrect, for he testifies that with the

defendant's machines 1, 3 and 4, operating as he saw them (with a wire speed claimed by him of 572 feet per minute, and with a 7⅞ inch head) gravity due to pitch, plus the initial speed of the stock, as it entered upon the wire, would bring the stock only up to a speed of 489 feet per minute, or 83 feet per minute less than the speed of the wire as he computed it, so that the drag of the wire, at the time Aldrich saw defendant's machines operating with the original pitch of 13½ inches, was accelerating the stock, at the rate of 83 feet per minute (Rec., p. 121).

UNDER THIS CONCESSION OF PLAINTIFF'S EXPERT, DEFENDANT'S MACHINES DO NOT EMPLOY EIBEL PRINCIPLE OR INFRINGE EIBEL PATENT.

We think this statement made by Aldrich as to the operation of defendant's machines, completely disposes of this case on the question of infringement. Certainly if, as defendant's machines are operated, substantially one-half of the acceleration of the stock after it enters upon the wire, is due to the drag of the wire, it cannot be asserted that in these machines

"the stock is caused to travel by gravity, rapidly, in the direction of movement of the wire, *and at a speed approximately equal to the speed of the wire*" (see claim 1 Eibel patent in suit. Italics ours).

Nor can it be contended that in defendant's machines

"the stock is caused to travel by gravity faster than the normal speed of the wire for a certain grade of stock" and the machines have "means for increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly moving stock" (see claim 2 of the Eibel patent in suit).

ALDRICH THINKS PITCH GIVES DEFENDANT'S MACHINE SOME BENEFIT.

Having asserted originally that in defendant's machines the acceleration of the stock up to speed equality with the wire is

produced by gravity due to the pitch of the wire, and that the effect of the drag of the wire, in such machines is insignificant. Aldrich, in rebuttal, endeavors to save the plaintiff's case by asserting that the inclination of the wire in defendant's machines is of *some* advantage, even though the effect of the drag of the wire, in bringing the stock up to speed equality with the wire, preponderates over the effect of gravity due to pitch (Rec., p. 122).

ALDRICH CONCEDES METHOD OF COMPUTATION USED BY DEFENDANT'S EXPERT CORRECT.

Plaintiff's expert concedes that defendant's experts have used the proper method of computation in figuring the initial velocity of the stock due to head, and its relative acceleration, due to pitch and drag of the wire (Rec., Aldrich XQs37-41; pp. 147-148).

PLAINTIFF'S EXPERT CONTENDS EIBEL PATENT EMPLOYED IF ANY ACCELERATION DUE TO PITCH OF WIRE IS OBTAINED.

It having been shown conclusively that in defendant's machines, even with the highest pitch ever employed—13½ inches at the breast-roll—the acceleration by drag of the wire preponderates over the acceleration due to pitch, Aldrich still contends that defendant is using the Eibel patent. This appears from his testimony in rebuttal under cross examination (Rec., Aldrich XQs49-52, 68; pp. 149-152).

From this it appears that plaintiff's expert contends that the Eibel patent is employed even though the acceleration due to pitch of the wire is less than the acceleration due to drag. In fact, it seems to be Aldrich's contention that the Eibel patent is employed whenever there is any acceleration of the stock due to a pitched wire. This we think appears from his testimony respecting defendant's No. 2 machine (Rec., Aldrich XQs 53-67; pp. 150-152).

THAT DEFENDANT GETS SOME BENEFIT FROM PITCH NOT SUFFICIENT TO MAKE CASE OF INFRINGEMENT.

Defendant submits, however, that it is not sufficient merely to show that defendant derived *some* benefit from the pitch of the wire, so long as it does not adopt Eibel's new principle of operation, consisting in causing the stock

"to travel by gravity faster than the normal speed of the wire * * * and increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly moving stock."

And does not cause the stock

"to travel by gravity, rapidly, in the direction of movement of the wire, and at a speed approximately equal to the speed of the wire."

These are the essential features of the alleged Eibel invention as set forth in his specification and claims.

If it had been pointed out to the Court of Appeals in the Remington-Martin case that the defendant's machine did not use the so-called Eibel principle, the decision would undoubtedly have been in favor of the defendant.

As defendant in this case has merely used a pitched making wire, and has increased the head, still calling upon the drag of the wire to perform a preponderating part of the work of accelerating the stock, after it enters upon the wire, to speed equality with the wire, it is clearly operating, not in accordance with the so-called Eibel principle of operation, but in accordance with the principle of operation of machines of the prior art, many of which obtained a considerable acceleration of the stock by means of a pitched wire.

COURT OF APPEALS IN THIS CASE HOLDS EIBEL PATENT REQUIRES GRAVITY DUE TO PITCH TO PRODUCE EQUALITY OF SPEED BETWEEN STOCK AND WIRE.

We have pointed out that the language of the patent clearly requires that the pitch given to the wire shall be sufficient to cause the stock to be brought by gravity alone due to pitch to approximately the same speed as the making wire. We have also pointed out that this was the original interpretation placed upon the Eibel patent by plaintiff's counsel and experts. We have also pointed out that beyond question this was the interpretation placed upon the patent by the Circuit Court of Appeals for the Second Circuit in the Remington-Martin suit.

This is also the interpretation placed upon this patent by the Circuit Court of Appeals for the First Circuit in the present suit. In the opinion of the court, after briefly describing the operation of a Fourdrinier machine, it is said:

"These Fourdrinier machines are expensive, costing about $100,000 each. As matter of economy, they run continuously, day and night. Speed—which means quantity—and quality of paper, have been for decades the constant quest of paper-makers. In operation it is manifest that, as the stock drains, meshes and settles upon the wire, it must at some point be brought to speed equality with the wire. It is agreed that this point of speed equality is, normally, about 9 or 10 feet from the breast-roll.

The evidence shows, and it is obvious, that if, as the bulk of the water drains out of the stock, there be too great difference between the speed of the wire and the speed of the stock, a commotion of ripples and waves will result which may, and frequently does, cause wrinkles and other defects in the paper. Moreover, if the forming fabric breaks, because of too high speed or other cause, the machine has to be stopped and continuous and economical production is prevented.

The evidence also shows, and it is manifest, that the successful operation of such a machine involves constant study and adjustment of numerous factors; such as the speed of the wire, the weight of paper desired, the quality of the stock (described as quick or slow, accordingly as the fibres part with the water quickly or slowly, as well as containing a varying amount of

water ranging from 135 to 200 times the weight of the fibrous matter), the amount of head in the flow box, as well as the grade of the wire-carrier.

There are three factors, all or any two of which may be used, in any preferred relative proportions, to bring about the necessitated speed equality between the stock and the wire, 9 or 10 feet from the breast-roll:

(1) Initial speed due to the head in the flow box from which the stock comes upon the wire. Heads in common use run from 2 to 10 inches. Obviously, the greater the head the greater the initial velocity of the stock.

(2) The wire itself may be pitched down-hill so as to give an increasing speed by gravity; it may be level; or it may be tipped the other way so as to require the stock to run uphill. These factors, described as two, are really only one,—head and down-hill pitch being nothing but gravity; or, as the plaintiff's expert put it, the lower the head the more pitch is required.

(3) The third factor is described as 'the drag of the wire,' meaning the acceleration between a lower initial speed at which the stock is assumed to start upon the wire, caused by the friction or adherence of the stock to the wire, in bringing the speed of the stock up to equality with the movement of the wire, on which it must ride as a pulpy fabric before it reaches the couch roll.

The plaintiff's general contention is that before Eibel made in 1907 his alleged invention, Fourdrinier machines running faster than 450 to 500 feet a minute caused irregularity, or 'wildness' in the paper, because at high speeds there was too great a difference between the stock speed and the wire speed to be overcome by the drag, resulting in carrying the under part of the liquid stock faster than the upper part, thus causing excessive and injurious waves and ripples. It is contended that Eibel conceived a notion described as 'a brilliant discovery' of calling in gravity applied by pitching the wire, to supplement drag as a means of speeding up the stock on the wire, thus obtaining a better quality of paper, and also enabling the wire itself to be speeded up beyond what had hitherto been regarded as the normal speed, so as to get a larger output. Eibel applies his alleged invention by blocking up the breast end of the machine, or by raising the breast end of the wire by a worm screw, or by any other suitable method. The infringement charged against the defendant is that it is operating its machines with the breast end of the machines, or at any rate the breast end of the wires, raised 12 to 15 inches above the level.

The defendant contends that the patent involves no invention; that Eibel's adjustment of the machines differs merely in

degree from practices shown in the prior art; and that if the patent can under any construction be held valid, the defendant does not infringe" (Rec., pp. 192-193).

After quoting extensively from the specification of the patent and the claims in suit, the Court of Appeals in its opinion proceeded as follows:

"No reference is made in the patent to head as a speed-producing factor. Gravity, due to pitch and not to head, and the drag of the wire, are the only speed-producing forces recognized by the patent, at any rate directly. In eighteen different places in the specification and twelve claims, Eibel refers to gravity as the force causing the stock to move approximately or substantially as fast as the wire moves. We have italicized such references in the portions of the patent quoted above.

The parties are in sharp and irreconcilable conflict as to the construction to be put upon the claims in suit. The plaintiff construes claims 1, 2, 3 and 12 as process claims, and contends that the words 'substantial elevation' in claims 1 and 3 and 'high elevation' in claim 2 cover any elevation of the breast-roll of the paper-making wire appreciably greater than that shown in the prior art, contended to be any elevation exceeding 5, or at any rate 6, inches. Plaintiff's expert testifies that a 5-inch pitch would not necessarily be the Eibel invention, 'but it might be on the border line'; that he hardly thinks a 4-inch pitch would involve the Eibel invention. It is therefore conceded by the plaintiff that the prior art shows pitches of 3 or 4 and perhaps 5 inches. Consequently, plaintiff contends that the words 'substantial elevation' and 'high elevation' in these claims cover all pitches an inch or more in excess of the pitches shown in the prior art.

The defendant contends that, so construed, the so-called process claims are void for indefiniteness and as differentiated from the prior art only by a mere change in degree. Also that the claims, fairly construed, limit or define the words 'substantial elevation' and 'high elevation' by the later language of the claims which, construed with the specification, means that the pitch must be enough so that gravity alone will bring the stock up to the speed of the wire. It is difficult to read the patent otherwise. As already noted, the patent is silent as to head. As the uncontradicted evidence shows that pitch adequate to eliminate drag is, even with a 2-inch head, not less than 48 inches, and that the defendant's alleged infringement consists only in using a pitch not exceeding 15, or at most 18 inches, the defendant contends that if the patent as fairly construed can

be held valid, there is no infringement.

Such pitches as 40 to 54 inches have never been used. It is not now claimed that Eibel discovered that such pitches are useful or that their use would be Eibel's invention. If, therefore, the patent describes such pitches, it describes something not claimed as an invention, as well as something not infringed. If Eibel did not mean such pitch as would practically eliminate drag, in eighteen places the language used requires a strained and unnatural construction.

The plaintiff—at any rate by implication—concedes that the first three claims which cover the essence of the alleged invention can be sustained only as process claims. It is noteworthy that no such word as 'process' or 'method' is found in these claims or in the specification. But it is not, and cannot be, contended that Eibel invented a new machine. As pointed out by Judge Warrington in the English decision holding the corresponding English patent invalid (*European Eibel Co., Ltd. v. Edward Lloyd, Ltd.*, Illustrated Official Journal (Patents), June 21, 1911, pp. 349, 356):

'The patentee proposes no alteration in the machine itself; the machine remains identically what it was before. He does not produce a new machine; all he suggests is what he considers a novel and useful mode of employing the old machine to produce the same article.'

The plaintiff does contend that claims 7 and 8, referring to adjusting the suction boxes so as to correspond with the pitch or declination of the wire are machine or machine improvement claims, but, apart from prior use, it is difficult to believe that such rearrangement of suction boxes as to enable them to perform their accustomed function of extracting water from the stock moving over the wire above, can be anything other than an ordinary mechanical adjustment. We cannot believe that claims 7 and 8 in and of themselves involve any invention. At any rate, prior use at the Northern Paper Company as early as 1904 effectually disposes of these claims.

Referring, then, to claims 1, 2, 3 and 12,—all of them deal with the old Fourdrinier machine so adjusted that the breast-roll end of the paper-making wire will have a 'substantial elevation.' The insertion of iron or wooden blocks under that end of the machine, or the raising of the wire by a worm screw, or by any other common device for lifting that part of the old machine,—is the only change required by the alleged invention. In a word, the plaintiff contends that the user of a Fourdrinier machine who blocks up the breast-roll end of the machine, say 5, 6 or more inches, is an infringer upon the Eibel patent.

There is obvious difficulty in construing these claims as process claims. They are not so phrased. It is elementary that the patentee can have nothing beyond what he has particularly pointed out and distinctly claimed, so that those familiar with the art may correctly draw the line between public right and private monopoly. *McClain v. Ortmayer*, 141 U. S. 419; *Merrill v. Yeoman*, 94 U. S. 568. Eibel says, in effect: 'I claim a Fourdrinier machine adjusted at such a pitch, downhill, that the stock will run as fast as the wire.' He does not say 'I claim a new process of making paper on a Fourdrinier machine, described as follows,' etc.

We find no case which flatly holds that a patentee who, in his specification and claims, refers to a machine, and nowhere claims a patent on a process, has been held entitled to have his patent construed as covering a process."

The court then discusses plaintiff's contention that the first three claims of the patent are to be construed as process claims and says:

"On the plaintiff's construction of the first three vital claims it is necessary to construe the words 'substantial elevation' in claims 1 and 3, and 'high elevation' in claim 2, so as to avoid the otherwise fatal objection of indefiniteness. What do the words 'substantial elevation' and 'high elevation' mean?

Now, as already stated, the plaintiff admits that the prior art shows elevations of 4, and perhaps 5, inches in the breast-roll end. The plaintiff is, therefore, necessitated to contend that the words 'substantial elevation' and 'high elevation' mean something in appreciable excess of the prior art elevation. The result is that, in effect, the plaintiff claims that if the prior art shows pitches of 4 inches, then 5 inches is Eibel's invention; that if the prior art shows 5 inches, then 6 inches is Eibel's invention. Obviously, this construction puts upon the reader of the patent, in construing the words 'substantial elevation' and 'high elevation,' the burden of knowing what pitches had been used in the prior art. Concededly a patent on a mere difference of degree in the use of a principle shown in the prior art is invalid. And so are all the authorities.

Smith v. Nichols, 21 Wall. 112, 22 L. Ed. 566; *Grant v. Walter*, 148 U. S. 547, 553, 37 L. Ed. 552; *Burt v. Evory*, 133 U. S. 349, 358, 33 L. Ed. 647; *Market Street Railway Co. v. Rowley*, 155 U. S. 621, 39 L. Ed. 284; *Fox v. Perkins*, 52 Fed. 205, 3 C. C. A. 32; *Galvin v. City of Grand Rapids*, 53 C. C. A. 165, 115 Fed. 511; *Eames v. Worcester Poly. Institute*, 123 Fed. 67.

We think it very clear that, adopting for the moment the

plaintiff's own construction of these claims as covering a process and as covering any pitch in the Fourdrinier machine appreciably greater than the 4 or 5 inches shown in the prior art, the claims cover nothing but a difference in degree" (Rec., pp. 198-199).

VI.

THE PRIOR ART.

THE BARRETT & HORNE PATENT NO. 691,333, JAN. 14, 1920. (Defendant's Exhibit V8, Rec., p. 1042).

This patent was not before the courts in the Remington-Martin suit. It shows a Fourdrinier machine having every element called for by the Eibel patent in suit, arranged exactly as called for in that patent, with means for adjusting the breast-roll above the level so as to produce the desired inclination of the upper run of the making wire.

The only difference asserted by plaintiff between the machine of this Barrett & Horne patent, and the machine of the Eibel patent, is found in the extent, or degree, to which the breast-roll end of the making wire can be adjusted above the level. While plaintiff admits that the Barrett & Horne patent discloses a machine in which the breast-roll end of the making wire can be adjusted above the level, so as to give an incline or pitch to that wire, it is asserted that the amount of elevation disclosed in the Barrett & Horne patent would not exceed three inches, on a full size machine, and that Barrett & Horne did not have in mind, in providing this pitch, the acceleration of the stock to the speed of the wire, but that their object was to get a better drainage effect by causing the stock to travel down the wire to the suction boxes.

The construction of the Barrett & Horne machine is clearly disclosed in the drawings of the patent, and is set forth in the specification. Referring to Figure 1 of the drawings, which is a side elevation of the breast-roll end of the machine, Figure 2

being a similar view of the rear portion of the machine, the breast-roll is indicated at 7, the making wire at 5 and the flow box at 10. The front end of the breast-roll frame 16 is provided with hooks 32, to which are connected the suspending cables 31, arranged in the hollow posts 30. The upper ends of these cables are connected to the screw-threaded rods 41 (Figure 4), which extend through the threaded worn gears 40. An operating shaft 50, with hand-wheel 56, is provided (Figure 3) by means of which the nuts 40 may be operated, screwing the rods 41 up or down, and thereby raising or lowering the breast-roll frame 16, the breast-roll 7, and the breast-roll end of the making wire 5.

In describing the operation of the structure the patentees say:

"From the above description it will be seen that the suspenders 31 are supported from the upper end of the posts 30 by means of the gear-wheel 40, and since the lower ends of the suspenders are connected to the breast-roll frame 16 this construction affords means for supporting the front end of the shake-frame from a point above the same. By turning the worm wheels 40 the hangers 41 may be raised or lowered to raise or lower the front end of the shake-frame, as desired" (Spec. page 2, lines 63-73).

Again the patentees say:

"From the above description it will be seen that the front end of the shake-frame is suspended from an overhead support, and the adjusting devices for giving to the said front end of the shake-frame its vertical adjustment, are entirely above the shake-frame and cannot, therefore, be injured by any moisture or water which overflows onto the floor" (Spec. page 2, lines 96-103).

The patentees, however, did not intend to be limited to the specific details of the structure shown and described in their patent, and they, therefore, inserted in their specification the following statement:

"Our invention is not restricted to the precise arrangement herein shown, as the same may be modified and re-arranged without departing from the spirit and scope of our invention as set forth in the appended claims" (Spec. page 2, lines 111-115).

The first claim of this patent reads as follows:

"In a paper making machine, a shake-frame, a support situated above the shake-frame, a plurality of suspenders hung from the said support and secured to the shake-frame at its breast-roll end, and means to simultaneously adjust said suspenders vertically, said adjusting means being situated above the shake-frame."

If this machine is operated in its regular, normal, and usual way, the front end of the frame, carrying the breast-roll, and the breast-roll end of the making wire, will be raised above the level. If the screws are long enough to permit an elevation of five inches it is conceded that the machine will embody the Eibel invention, and be within the terms of the Eibel patent.

The principal argument advanced against the Barrett & Horne patent is (1) that the greatest pitch that could be obtained by machines constructed under the patent was three inches, which plaintiff characterizes as a "trivial" pitch, as compared with a five-inch pitch which it is asserted would be a "substantial" pitch within the meaning of the specification and claims of the Eibel patent; and (2) that Barrett & Horne had in mind only the advantage of bringing the stock down to the suction boxes to secure better drainage, and did not appreciate or perceive the speeding-up-of-the-stock advantage which resulted from the pitched wire.

The trial court accepted this argument and referring to the Barrett & Horne patent said that it found "no claim of any novelty in respect to an effort toward adjustment, for the purpose which Eibel disclosed," and that the prior patents "do not disclose that these adjustments are for the Eibel purpose of reducing the relative speed of stock and wire." It, therefore, rejected the Barrett & Horne, and other patents, as anticipations of the Eibel invention.

We have called attention to the fact that two advantages are obtained with any pitched wire. These are (1) the speeding-up-of-the-stock advantage, which Eibel had in view and which

is pointed out in his specification and claims, and which is not mentioned in the Barrett & Horne patent, although necessarily resulting from their pitched wire construction, as pointed out by defendant's expert, Livermore (Rec., p. 981); and (2) the drainage advantage, which is not mentioned by Eibel, and which is specified in the Barrett & Horne patent.

Plaintiff's expert testifies that the drainage advantage necessarily results from the pitch of the wire disclosed in the Eibel patent, although this fact is not mentioned in the Eibel specification (Rec., p. 27). This is undoubtedly true. It is equally true that the speeding-of-the stock advantage results from the pitched wire of the Barrett & Horne patent, although that advantage is not mentioned in the specification of their patent.

We, therefore, have a situation where a pitched wire, disclosed in both the Barrett & Horne and the Eibel patents, produces two effects, the speeding of the stock, and better drainage. Barrett & Horne, in their patent, refer to the pitch or inclination of the wire with one effect in mind, and Eibel, in his patent, refers to a like adjustment, or pitch, with another effect in mind. As Livermore points out:

"Of course, whatever effect the adjustment will produce will be just the same whether an operator had that particular effect in mind or not in making the adjustment" (Rec., p. 981).

It is clear that Eibel, if he had a valid patent, could not be deprived of the advantage of the drainage effect because he did not perceive it, nor could Barrett & Horne be deprived of the advantage of the speeding-of-the-stock effect, because they did not perceive it. This is clear from all of the authorities. A recent case, directly in point, is *Scaffolding Co. v. Chain Belt Co.*, 254 U. S. 32, 37, in which Mr. Justice McKenna, delivering the opinion of the Supreme Court, said:

"We yield to the assertion of counsel that he (the patentee of the patent in suit) cannot be deprived of an advantage because he did not discern it, but the same concession must be given to Murray (a prior patentee). He (Murray) was entitled

to all of the benefit that he claimed for his device, *or that can be given to it by formal changes.*" (Italics ours.)

The only thing lacking in the Barrett & Horne patent, as asserted by plaintiff, and by the trial court in its opinion, is a capacity for inclining the wire more than three inches, and a perception that a pitched wire would produce a speeding of the stock, and, therefore, a reduction of the "relative speed of stock and wire." It is conceded that no change, except a lengthening of the adjusting screws, would be required in the Barrett & Horne machine to bring about a five-inch pitch, which it is said would be a "substantial" pitch and constitute the Eibel invention. We think it must be conceded that such a change in the Barrett & Horne structure would be what the Supreme Court, in the Scaffolding case characterizes as a "formal change." Applying the rule there laid down, by the Supreme Court, to this case, it must be apparent that Barrett & Horne (and the public since the expiration of their patent) were "entitled to all of the benefits that they claimed for their device, or that can be given to it by formal changes," even though they did not discern, or have in mind, the benefit obtained by their device in speeding up the stock and reducing the relative speed between stock and wire, but only the better drainage effect produced by their adjustment. We cannot conceive that a change in the amount of adjustment, from three inches to five inches at the head of the wire, can be anything more than a "formal change."

In this connection the decision of the Supreme Court in *Ansonia Brass & Copper Co. v. Electrical Supply Co.*, 144 U. S. 11; 36 L. Ed. 327, is also particularly applicable. In that case the patent was upon the method of insulating electric conducters and rendering the coating substantially incombustible by alternating layers of fibrous material and paint. It was shown by the testimony that an incombustible covering for electric wires for use in burglar alarms had been employed prior to

the invention of the patent in suit, in which paint was employed in connection with thread wound around the wire. The user of this prior device had no thought of its incombustibility, and did not apply the paint for that purpose. The Supreme Court speaking by Mr. Justice Brown, said:

"It is true that the insulator used by Holmes was not intended to be, and perhaps was not known to be, incombustible, since this feature of its incombustibility added nothing to its value for protecting a burglar alarm wire, which carries a current of comparatively low tension; but, as already observed, the testimony indicates that the insulator employed by him was in fact nearly, if not quite, as incombustible as that made by the plaintiff under the Cowles patent. If this be so and the two insulators are practically the same in their method of construction, it is clear that Cowles has no right to claim the feature of incombustibility as his invention, since nothing is better settled in this court than that the application of an old process to a new and analogous purpose, does not involve invention even if the new result had not before been contemplated."

In *Penn. R. R. v. Truck Co.*, 110 U. S. 490, 28 L. Ed. 232, Mr. Justice Gray, delivering the opinion of the Supreme Court, said:

"It is settled by many decisions of this court, which it is unnecessary to quote from or refer to in detail, that the application of an old process or machine to a similar or analogous subject, with no change in the manner of application and no result substantially distinct in its nature, will not sustain a patent, *even if the new form of result has not before been contemplated.*" (Italics ours.)

In *Blake v. San Francisco*, 113 U. S. 679, 28 L. Ed. 1070, Mr. Justice Woods speaking for the court, said:

"It follows from this principle that, where the public has acquired in any way the right to use a machine or device for a particular purpose, it has the right to use it for all the like purposes to which it can be applied, and no one can take out a patent to cover the application of the device to a similar purpose."

In *Stow v. Chicago*, 104 U. S. 517, 26 L. Ed. 816, it was said:

"A patentee who is the first to make an invention is entitled

to his claim for all the uses and advantages which belong to it. It is shown that Stead invented this device. *Whether he perceived and stated all its advantages is immaterial.*" (Italics ours.)

In *Codman v. Amia*, 70 Fed. 710, Judge Aldrich, in dismissing a bill for want of invention in the patented device, said:

"The claim of the complainants that the older atomizers were not designed for the particular use to which their device is peculiarly adapted is no answer to the fact that the older devices would perform the same functions."

This decision was affirmed. 74 Fed. 636.

In *Wright & Colton Wire Cloth Co. v. Clinton Wire Cloth Co.* (C. C. A. First Cir.), 67 Fed. 792, Judge Aldrich, delivering the decision of the court, said:

"Under the doctrine which gives to the patentee all the uses to which his invention is susceptible, whether known or unknown, it is difficult to see why the public should not be entitled to all the uses to which the means involved in devices covered by lapsed patents are susceptible. * * * To say that one who discovers that old means will do a new work without any change may thereby monopolize the old means as applied to such new work, or, in other words, to say that because of such discovery others engaged in the wire cloth industry shall not, in weaving, run a wire thread through the means used in the older industry, would be carrying the discovery doctrine altogether too far."

Barrett & Horne show in their patent a flow box, marked 10 in the drawing. They call this the "feed-box" and say that it may be of any usual construction. Aldrich has testified that it was usual prior to Eibel to employ flow boxes with a two-and-a-quarter inch head, so that the stock would flow onto the making wire with an initial velocity of 200 feet per minute. It is fair then to assume that Barrett & Horne intended the flow box, shown in their patent, to produce an initial velocity of the stock of at least 200 feet per minute. If Barrett & Horne used this head, and a three-inch pitch on the wire, they would obtain, at a point one-third the way down the wire, a velocity

of stock of 240.6 feet per minute.

Now if we compare the speed of the stock, at a point one-third the distance down the wire, obtained with the Barrett & Horne machine, with the speed obtained with an Eibel machine, having the same head in the flow box, and with a five-inch pitch of wire, which Aldrich says is a "substantial" pitch within the contemplation of the Eibel patent and claims, we find that the Eibel machine, so arranged, at a point one-third of the distance down the making wire, will have a speed of substantially 275 feet per minute.

The difference in speed of stock between Barrett & Horne and Eibel, therefore, if operated under this same head, will be only 35 feet per minute, at a point one-third down the wire in each machine.

But Barrett & Horne show a flow box 10 evidently capable of carrying a very much higher head than two-and-a-quarter inches. The testimony in reference to the use of the Barrett & Horne machine, to which we shall refer later, shows that as these machines were operated, they usually carried a head of from three to four inches. The Barrett & Horne machine, with a three-inch pitch on the wire, and a three-inch head in the flow box, produces slightly greater speed of the stock at a point one-third the distance down the wire, than does the Eibel machine, with a two-and-a-quarter-inch head, which Aldrich says it was customary to use at the date of the Eibel invention, and a five-inch pitch, which Aldrich designated as a "substantial" pitch within the scope of the Eibel specification and claims. The Barrett & Horne patent, as plaintiff asserts it was used, therefore, accomplished all that Eibel accomplishes in reduction of the relative velocity of the stock and wire.

Bayless Austin Machine of 1902.

The first prior art machine analyzed by Carter, and illustrated upon his diagrams, is the Bayless machine installed at

Austin, Pennsylvania, in 1902. This machine was constructed by J. H. Horne & Sons Company, substantially in accordance with the drawings and specifications of the Barrett & Horne Patent No. 691,333, issued January 14th, 1902, to which we have referred. The following explanation is made upon the Carter Diagram Sheet No. 2 (Rec., following p. 1092, Sheet 165):

"Diagram No. 5. Bayless Austin Machine, 1902.
Barrett-Horne Patent No. 691,333, Head (average) 3 to 4 in.
Paper speed 300-350 f. p. m. Pitch 3-6 in.
23 ft. breast roll to guide roll.
With 4 in. head—5 in. pitch.
Velocity of stock due to head 260 f. p. m.
Velocity of stock due to pitch 72 f. p. m.
Total velocity of stock due to gravity of head and pitch 332 f. p. m., which is substantially the speed of wire if paper speed is 350 f. p. m.
Drag of Wire Eliminated.
Percentage of total velocity due to pitch 21+%"

The construction and mode of operation of this machine is established by the testimony of the following witnesses called by the defendant, and the documentary evidence produced and offered during their examination:

George H. Brown,	Rec. pp. 670-690
John Anderson,	" " 691-701
George C. Bayless,	" " 701-718
Byron F. Horne,	" " 717-768
Charles E. Barrett,	" " 768-786
John E. Horne,	" " 786-800
Chas. E. Barrett (Re-called),	" " 800-812
John Newman Davis,	" " 812-823
John Newman Davis (Re-called),	" " 862-885
Louis C. Smith (Stipulated),	" " 996

The structure of the machine is shown in Exhibits V and V-5 (Rec., following p. 1085).

An examination of the testimony of the witnesses above noted

will disclose that the principal features of the machine, together with the date of installation, are correctly summarized upon Carter's diagram.

The correspondence between the Bayless Pulp & Paper Co. and J. H. Horne & Sons Company, respecting the construction of this machine is in evidence as "Defendant's Exhibits V-2 and V-3" (Rec., pp. 750-751).

The specification under which the machines were constructed is in evidence as "Defendant's Exhibit V-4" (Rec., p. 764).

George C. Bayless, of the Bayless Pulp & Paper Company, testified that his company began to use a pitched wire upon a Fourdrinier paper machine in the year 1894; that the machine had a short wire, about thirty-three feet, and the breast-roll end of the machine was raised by two hardwood pieces about twelve feet long running from the breast-roll stand under the permanent rail behind the suction boxes; that the wedges were perhaps 3/8 of an inch thick at the thin end, and about four inches thick at the top end, giving the breast-roll an elevation of about three or three and one-half inches (Rec., p. 703).

This machine operated at Binghamton until it was dismantled and moved to Austin. Ground was broken for the Austin mill in July, 1900. The sulphite end was operating in the spring of 1901, and the paper machines were in operation in the early part of 1902 (Rec., p. 702).

The machines for the Austin mill were ordered from J. H. Horne & Sons Company. One machine was started about May, 1902, and the other one about two months later (Rec., p. 705).

As to the purpose of this adjustment he had prescribed for the machines built by Horne, Bayless testified:

"Q36. What was the purpose or object in asking Horne to provide the machine with this adjustment that you have spoken about?

A. *We had found that the machine at Binghamton worked quite satisfactorily with a certain amount of pitch. We proposed to run these machines at a much higher speed than the*

Binghamton speed and consequently I wanted more pitch than I had on the Binghamton machine for light weight paper. (Italics ours.)

Q37. Why did you want the pitch on the light weight paper in the operation you wanted to get?

A. *Because we could get a much better formed sheet by reason of running the stock on the wire at practically the same speed of the wire, and get the water well down to the suction box, enabling us to make a better formation of the sheet*" (Rec., pp. 704-705). (Italics ours.)

In the early years of its use the machine was run with a pitch all the way from three to five inches, although at times it may have been used with a two inch pitch (Rec., p. 707).

Bayless testifies that they expected to run the Horne machines much faster than they had been running the light machines at Binghamton, and he says:

"We always have been running faster. The wire was longer, the drying surface was greater, the calenders more of them and larger rolls, so that that machine could run much faster on 40 lb. paper than we could run it here in Binghamton" (Rec., p 706).

Bayless is fully corroborated as to the operation of the machine by the witness, John N. Anderson, who began work in the Austin mill at the time it started up in 1902 (693-694).

The contracts, correspondence, and drawings, produced by witnesses from the Horne Company, establish beyond question the date when the Bayless machines were furnished. This was early in 1902. The drawings also show the details of the construction, and make it certain that the machines, as originally installed, were capable of having their breast-roll ends elevated five to six inches, so as to give, at least, a five-inch pitch between the breast-roll and the suction boxes.

The witness Anderson has explained how, in operation, the suction boxes were adjusted by placing a one and one-half inch block under the pedestal where the shake rails and suction rails divide (Rec., pp. 693-694).

The witness George H. Brown, also corroborates Bayless as to the adjustment of the breast-roll to a height of "five to six inches," and the placing of blocking under the "middle post" so as to give a true pitch to the wire from the breast-roll to the guide-roll (Rec., p. 672).

The construction and mode of operation of the Bayless machines is fully established by the witnesses, Bayless, Anderson and Brown, and that the pitch was given to the wire in the Bayless machine, not only to bring the stock down to the suction boxes, but also to enable the machines to be speeded up by causing the stock to run at substantially the same speed as the wire.

It is to be noted that in this machine the drag of the wire was entirely eliminated as the machine was operated during the period beginning shortly after its installation. The speed of the stock as it came on to the wire—its initial speed—was 78+% of the speed of the wire. It was necessary to accelerate the stock only 21+% of the speed of the wire to bring about speed equality between stock and wire. This was done solely by gravity due to pitch, and the drag of the wire was wholly eliminated.

This Bayless machine, as operated soon after its installation, clearly meets all of the requirements of the Eibel invention, as the same are set forth by plaintiff's expert, Aldrich, on cross examination, in his original deposition (Rec., Aldrich, pp. 68-69).

The Bayless machines were not before the courts in the Remington-Martin case.

KIMBERLY-CLARK MACHINES OF 1904.

The Kimberly-Clark machines were built by the Beloit Iron Works and were installed in the Kimberly-Clark mill at Kimberly, Wisconsin, in 1904. The analysis of the operation of

the machines is given in connection with the Carter Diagram No. 7 (Exhibit W, sheet 167, Rec., following p. 1092), as follows:

Diagram No. 7. Kimberly-Clark, Kimberly Machine, 1904.
Head 2½ to 6 in. speed per contract 50-300 f. p. m.
Drive changed to permit 425 f. p. m.
Point of speed equality wire and stock 7 ft. from slice.
Total pitch (Moore & White) adjustable to 6 in. net pitch 1 5/6 in.
27 ft. 9 in. breast-roll to guide-roll.
With head of 2¾ in. Pitch of 5½ in.
Velocity of stock due to head 210 f. p. m.
Velocity of stock due to pitch 80 f. p. m.
Total velocity of stock due to gravity of head and pitch 290 f. p. m.
Assuming wire speed 350 f. p. m. drag of wire 60 f. p. m.
Percentage of velocity due to pitch 23%.

The construction and mode of operation of these machines is established by the testimony of the following witnesses, called by the defendant, and the documentary evidence produced and offered during their examination:

Peter R. Thom (Rec., pp. 323-347).

Noble J. Ross (Rec., pp. 351-429).

Joseph A. White (Rec., pp. 597-630).

As explained by Thom these machines were built in accordance with specifications dated April 25th, 1904. They were installed in the mill, and the mill was started up in the spring of 1905 (Rec., pp. 329-330). As installed the machines were provided with means for adjusting the breast-roll end of the Fourdrinier from two inches below level to six inches above level (Rec., p. 330). When first put in operation in the spring of 1905 the breast-rolls were given an elevation of four inches, and they were thus operated until 1910, when they were raised two inches more by the same adjusting screws (Rec., p. 332).

The testimony of Ross fully corroborates the statement of Thom that the machines, as originally installed, were capable

of being raised six inches above the level (Rec., pp. 353-361).

Joseph A. White, also called as a witness by defendant, testified as to furnishing the adjusting screws and the related parts to the Beloit Iron Works for the Kimberly-Clark machines.

White produced the orders and drawings for these parts, and stated that the devices were shipped to the Beloit Iron Works on December 2nd, 1904. The vertical adjusting screws had the symbol "2 F19" (Rec., p. 599).

The mechanism of the adjusting devices of the Kimberly-Clark machine is shown in the Moore & White patent No. 684,081, issued October 8th, 1901, a copy of which is in evidence as "Defendant's Exhibit K" (Rec., p. 1060). The structure is also illustrated in the Moore & White folder, "Defendant's Exhibit U-2" (Rec., p. 1088, sheet 151), and is also shown in the blue print, Defendant's Exhibit O (Rec., p. 1092, sheet 159).

It is claimed by plaintiff that Thom and Ross are mistaken in stating that when the Kimberly-Clark machines were originally installed in 1904, they were capable of a six-inch adjustment, as it appears from the testimony of White, and the records of the Moore & White Company that when additional machines were provided in 1909 and 1912, they were furnished with longer adjusting screws (Rec., pp. 616-617).

Thom, however, testifies positively that the machines are still operating with the original screws, and Ross has no knowledge of any change having been made in the screws of the original machines (Rec., p. 393). Moreover, a diligent search failed to disclose any record of new screws ever having been furnished for these original machines by the Moore & White Company (Rec., p. 617), and White testifies positively that while all of his original machines were designed for a pitch anywhere from two to four inches and could go four inches without any difficulty, "If they wanted to strain a couple inches more, by a little tinkering in the mill, they could do it" (Rec., pp. 628, 629, 630).

It is clear that the machines were operated when originally

installed at a four-inch pitch, and sometime later, without any change whatever in construction, and without any new adjusting screws, were raised to the 5½-inch pitch which they now have.

With these machines 60% of the total speed of the stock is initial speed due to head, 23% is due to the five and one-half inch pitch of the wire, and 17% to the drag of the wire.

These machines were not before the court in the Remington-Martin case.

NIAGARA (KIMBERLY-CLARK) MACHINE OF 1904.

The construction and operation of this machine is disclosed by the testimony of defendant's witnesses, Joseph A. LeValley and P. R. Thom.

The structure and operation of the machine is set forth in the Carter Diagram No. 10 (Rec., following p. 1092, sheet 167), as follows:

"Diagram No. 10, Niagara, Wis. (Kimberly-Clark) 1902.
Paper speed 450-475 f. p. m.
Pitch ¼ in. Head not stated.
Wire flat beyond first suction box.
25 ft. breast-roll to guide-roll.
With head 2-3 in.—wire speed about 435 f. p. m.
Speed of stock due to head 210 f. p. m.
Speed of stock due to pitch 95 f. p. m.
Speed of stock due to drag 130 f. p. m.
Percentage of speed due to pitch 22+%."

In reference to blocking up this Niagara machine in 1902, Thom testified:

"The machine was set without any pitch, but there was a superintendent came there and he asked me for the privilege of raising the machine, and I asked him if he thought he would get enough benefit from it to justify it and he said, 'Yes, I think we can do better.' I said, 'I think you can do some better; go ahead.' I said, 'How much do you propose?' He said he would raise it four inches anyhow. He raised them four inches.

Q49. When was that?

A. 1902" (Rec., pp. 326-327).

Thom further testified that he was general superintendent of the Kimberly-Clark mills at this time; that he went up to the Niagara mill about the first of January, 1902, when this superintendent left and that he stayed there and ran the mill until the next October, and the two machines, at the Niagara mill, were blocked up before he went there to run the mill. This same blocking continued under these machines all the time Thom was there in 1902, and as long as he was "going around the mills," which had been up to within about two years of the date when his deposition was taken in this case (May 28th, 1917). The suction boxes were adjusted so that the wire lay perfectly flat on them to get the suction. In making newspaper the machines ran from 450 to 475 f. p. m. (Rec., pp. 326-329).

Joseph LeValley who worked at the Niagara Mill from 1901 for a period of six years and two months, testifies that the making wires of the Fourdrinier machines were running level in 1901, and were raised six inches between 1901 and 1902. An incline was given to the wire by raising the Fourdrinier and supporting it on blocks (Rec., pp. 247-248). LeValley also testifies that the Niagara machines ran at a paper speed of 475 f. p. m. LeValley had some difficulty in remembering the name of the superintendent who put the blocking under the Niagara machine, and finally concluded that it was Ludwig (Rec., p. 261). Thom testified that the superintendent's name was Lewthwaite. We are inclined also to accept Thom's statement that the blocking was four inches high instead of six inches as testified by LeValley.

It is clear from Thom's testimony that he fully understood that in running at a high speed with the wire level there was a tendency for the wire to "draw away from the flow of the pulp" and that a better formation would be obtained by relieving "the drawing of the pulp as it entered onto the wire."

Thom has had a large experience as a paper mill operative and practical superintendent, and he fully understood, as ap-

pears from his testimony, that by pitching the wire so as to lessen the drag of the wire on the stock he would increase the velocity of the stock by gravity, and in that way obtain a better formation of the sheet.

This machine was not before the courts in the Remington-Martin suit.

LISBON FALLS MACHINES OF 1902-1905.

The machines in the Lisbon Falls Mills (Carter Diagram No. 8, following Rec., p. 1092, sheet 167) and the machines in the Pejepscot Mill (Carter Diagram No. 14, sheet 169), all belong to the Pejepscot Paper Company and are operated under the supervision of Charles R. Dickinson. Lisbon Falls is about ten or eleven miles from Brunswick, Maine, and Dickinson has been superintendent of the Lisbon Falls Mill since 1891. He first went to this mill as machine tender. At that time the mill had one Fourdrinier machine, built by Pusey & Jones, running at a speed of from 237 to 358 feet, and making Manila paper. In 1898 this mill began making news. In 1894 a second machine had been added. Both machines were used for making news in 1898.

As constructed the machines were provided with means for adjusting the breast-roll end an inch above or an inch below the level. These machines were rebuilt in 1900 by Pusey & Jones; sixty-five foot wires were substituted for the forty foot wires, fifteen more dryers were added, and there were also "new back lines and reels and winders." Three suction boxes were also added to each machine (Rec., pp. 727-728).

Dickinson had a positive record that on October 24th, 1900, this machine was started at a speed of 545 feet, and that the wire was pitched an inch and a half down hill, one inch of the pitch being obtained by the adjusting device on the machine, and one-half inch by blocks under the frame.

The No. 2 machine was started with the wire level, but in June, 1902, Dickinson raised the No. 2 machine so as to get a pitch of about three inches. This was done by using the one-inch adjustment on the frame of the machine, and by putting two-inch blocks or shims under the machine.

In 1904 or 1905 Dickinson substituted three-inch blocks for the two-inch blocks he had put under the machine in 1902, thus giving these machines the four-inch pitch, which they now have.

The change to the four-inch pitch by the use of the three-inch blocking, and the inch adjustment on the machines, was in place before Dickinson heard of the pitch employed by Eibel at Rhinelander (Rec., pp. 734, 738).

These machines are running today with the four-inch pitch adopted prior to the date of the Eibel invention.

Moreover, Dickinson has made it clear that this pitch was used by him for the purpose of permitting a better formation of the sheet than was obtained when the machine was run at a high speed and with little or no pitch of the wire. In other words, Dickinson had a very clear idea of the relationship between speed and pitch, and adopted the pitched wire for the purpose of obviating cross waves on the sheet. This is made clear from his testimony, from which we quote as follows:

"Q87. Now, Mr. Dickinson, what was your object in giving the pitch to the wire on these machines after they were rebuilt when you were running news?

A. I was troubled with cross waves on the sheet.

Q88. In what way did those cross waves affect the paper?

A. Made heavy and light streaks in the paper.

Q89. Thick and thin places?

A. Yes, sir.

Q90. How did you remedy that—attempt to remedy it?

A. I experimented and raised the machine up.

Q91. What did that do?

A. That seemed to smooth the sheet off. It seemed—why, the water seemed to cut the speed of the stock, picked up with the wire better.

Q92. And then what did you find about these waves after

you gave this machine this amount of pitch?

A. They were smoother, more uniform.

Q93. And did that seem to get rid of the cross waves?

A. Yes. It stopped the cross waves and the make-up of the paper was better, more even" (Rec., p. 730).

Later Dickinson raised the wires on the machines at the Pejepscot mill and testified as to the purpose and effect of this raising as follows:

"Q129. What was your purpose in raising those?

A. We were having about the same trouble we were having at Lisbon—the cross waves on the paper.

Q130. What was the effect of the change you made?

A. By raising the Fourdriniers higher, the sheet smoothed out" (Rec., p. 732).

Dickinson made it very clear, on cross examination, that in blocking up the machine to get the pitch on the wire, his purpose was to get the waves out of the sheet, and was not the same as in providing a different amount of drainage according to whether the stock was free or slow. We quote from his testimony, when cross examined by plaintiff's counsel, as follows:

"XQ194. Now, you said that when you were using that adjustment, prior to the time you put in the shims, you ran the wire up hill with heavy Manila paper and down hill when you were using a high per cent of sulphite stock?

A. Yes, sir.

XQ195. Why was that; what was the reason?

A. The water would leave the sheet with high percentage stock near the slice and I wanted to carry it down.

XQ196. Through the suction boxes?

A. Towards the suction boxes.

XQ197. You mean that the stock with a high per cent of sulphite was free?

A. Was free, very free.

* * * * * * * * *

XQ199. And the purpose for which you used the blocking was the same that led you to use the down hill adjustment on the two machines before you put in the blocking?

A. I used the blocking when we built over to stop the cross

waves we were having on the sheet.

XQ200. That was because in making news you were using freer stock?

A. Ground wood.

XQ201. That is freer stock?

A. Slower stock. The sulphite is the freer stock and the ground wood is slower stock.

XQ202. Well, I want to know whether the purpose that you had in mind in putting those shims under was the same purpose that you had in mind when you ran the wire one inch down hill without a shim, or whether it was a different purpose?

A. It was a different purpose? (Rec., p. 736).

It will, therefore, be seen that prior to Eibel's alleged invention not only was the idea of a pitched wire old, but that the pitched wire was used for the same purpose for which it was used by Eibel—to smooth out the sheet and get rid of cross waves in it.

Moreover, Dickinson used with his pitched wire a comparatively high head—seven or eight inches (p. 730).

We have already shown that a head of eight inches, on a seventy foot wire, is the equivalent, so far as acceleration of the stock is concerned, to an elevation of twenty-four inches of the breast-roll end of the wire.

In other words, with an eight-inch head, and a two-inch pitch, on a sixty-foot wire, Dickinson got as high speed of the stock at a point eight or ten feet from the slice as Eibel got with a two-and-a-quarter-inch head and a twenty-one inch pitch of the wire.

In the Lisbon mill, with an eight-inch head and an inch-and-a-half pitch, the stock was given a speed of substantially 405 feet per minute, at a point ten feet down the wire, which is greater than the total speed due to both head and pitch now employed on Defendant's No. 2 machine, running at a wire speed of 585 feet per minute, and making paper at substantially 620 feet per minute. There is no reason, therefore, why if Dickinson had had sufficient power, and a sufficiently heavy

and substantial machine and drive, he could not have operated his machine at as high a speed as that at which defendant's machines are operated.

It appears from the testimony of Dickinson that the Lisbon Falls machine, with the inch-and-a-half pitch, was started off in 1900 at a speed of 545 f. p. m. This speed was increased to 569 f. p. m. (Rec., p. 731). Later it was necessary to cut down the speed for various reasons that are explained by Dickinson (Rec., p. 731).

It is apparent that when in 1904 Dickinson increased the pitch of his machine to four inches, by putting under them three-inch blocks, and using the inch adjustment on the table, or frame, he was enabled to use a lower head, as we find the machines now operating with a total pitch of four inches and a head of six inches.

Carter, who examined the machines in the Lisbon Falls mill, found that the sheet smoothed out ten feet from the slice. He, therefore, figured the net pitch at two inches. With a head of six inches, and a net pitch of two inches the stock is brought by gravity, due to the initial head and the net pitch, to a speed of 390 f. p. m. at a point practically ten feet from the slice. The present wire speed is 490 f. p. m. Of this 325 f. p. m. is due to the initial head; 66 f. p. m. to gravity due to pitch, and 99 f. p. m. to the drag of the wire.

Carter has analyzed the operation of the Lisbon Falls machines, in connection with his diagrams (Exhibit, p. 167), as follows:

"Diagram No. 8. Lisbon Falls, Me., 1902-1906 and continuing; present wire speed 490.
Head 6 in., paper speed 520-569 f. p. m. Present speed 530 f. p. m.
Point of speed equality wire and stock 10 ft. from slice.
Total pitch breast-roll to first suction box 4 in.
Wire flat beyond. Net pitch 2 in.
28 ft. breast-roll to guide roll.
Speed of stock due to 6 in. head 325 f. p. m.

Speed of stock due to pitch 66 f. p. m.
Speed of stock due to drag of wire 99 f. p. m.
Percentage of speed due to pitch 13+%."

We consider the Lisbon Falls machines among the most important of the structures in use prior to the date of the alleged Eibel invention, for the reason that Dickinson clearly had in mind the idea of speeding up the stock for the purpose of smoothing out the sheet, and by using a pitch of from an inch and a half to four inches, with a head of from six to eight inches, he got the same acceleration of the stock, that he would have obtained with a small head—two and a quarter inches for example—evidently contemplated by Eibel, and a pitch of from eighteen to twenty-four inches.

We believe we have made it clear that as a factor in accelerating the speed of the stock to equality with the speed of the wire, adding one inch to the head is equivalent to raising the breast-roll end of the wire three inches, so that a head of six inches, and a net pitch of two inches is the full equivalent of a head of two inches and net pitch of six inches, or a total pitch of eighteen inches.

No evidence respecting these machines was before the courts in the Remington-Martin suit.

THE BAGLEY & SEWALL MACHINES OF 1904.

The Bagley & Sewall Company, of Watertown, N. Y., is now, and has been for years, one of the leading manufacturers of paper-making machinery. Stuart Lansing is the president of the company. The machines manufactured by this company were among the fastest machines in use prior to the date of the application for the Eibel patent in suit, and Mr. Lansing and Clarence E. Kinney, secretary and mechanical engineer of the Bagley & Sewall Company, have as clear ideas of the practical condition of the paper-making art at that time as any witnesses examined in this case.

Moreover, Mr. Lansing was able to produce several letters written to his company between 1903 and 1905, showing the speed at which their machines were then being operated. He also produced an article written by him which appeared in the publication known as the "Paper Mill" under date of February 10, 1906, and an advertisement of his company appearing in the publication "Wood Pulp News" on the same date (Rec., p. 1086, Defendant's Exhibits T-3, T-4, T-6 and T-7).

In the letter to the "Paper Mill" of February 10th, 1906, eight months before the date of the Eibel application, Lansing said:

"We thoroughly believe in the high speed machine for the manufacture of news paper. We have run our machines through a period of years constantly at a speed upward of 550 feet per minute, and have had some machines which have made paper satisfactorily at 580 feet a minute, and the fastest at 618 feet a minute."

Lansing also produced the catalogue of the Bagley & Sewall Company for the year 1905, and identified cuts of machines in said catalogue, and description thereof prepared by him. Contracts and blue prints were also produced showing the construction of machines manufactured and sold by the Bagley & Sewall Company in 1904 and 1905. This evidence shows that in the years 1904 and 1905 the Bagley & Sewall Company were building paper machines, with provision for adjusting the breast-roll end of the Fourdrinier to a height of 3½ inches above the level, with the wire beyond the suction boxes flat or level. Provision was made for operating these machines with a head of eight inches. These machines were constantly run with speeds of 530 f. p. m. at the first dryer, which would mean a paper speed of about 575 f. p. m., and at least in one instance one of the machines had made paper at 618 f. p. m.

As pointed out on the Carter Diagram, these machines had a net pitch of one and three-fourths inches, and, with a head of eight inches, the same speed of stock was obtained, by head

and pitch, at a point about one-third of the distance down from the slice, as would be obtained on a machine having a two-inch head and a total pitch on the wire, of twenty-three and three-fourths inches.

Carter's Diagram expressing the data furnished by the testimony of Messrs. Lansing and Kinney, and the Bagley & Sewall blue print of the 1904 machine (Rec., p. 1092, Exhibit W) shows the following:

"Diagram No. 9. Bagley & Sewall (Blue print Ex't) 1904.
Speed (at dryer) 530 f. p. m.
Total pitch 3½ in. Head 8 inches.
Net pitch 1¾ in. Wire flat beyond first suction box.
27 ft. 9 in. breast-roll to guide-roll.
Speed of stock due to head 380 f. p. m.
Speed of stock due to pitch 50 f. p. m.
Speed of stock due to drag of wire 100 f. p. m.
Percentage of speed due to pitch 10%."

In 1904 the Bagley & Sewall Company produced a drawing that has been offered in evidence as "Plaintiff's Exhibit T" (following Rec., p. 1084), with a detail for the adjustment of the breast-roll end of the Fourdrinier, in evidence as "Defendant's Exhibit T-1" (following Rec., p. 1084). A machine in accordance with this drawing was built for the Raymondville Paper Company (Kinney, Rec., pp. 554-555). Three of these machines were built in the year 1904, the second one going to L. L. Frese Paper Company at Norwood, N. Y., and the third to Columbia River Paper Co., Camas, Washington. The Bagley & Sewall Company continued to build these machines until 1906 or 1907 (Kinney, Rec., p. 558).

The contract for the Raymondville machine is in evidence as "Defendant's Exhibit T-11." The date of the contract is March 5th, 1904. In reference to the adjustment of the breast-roll end of the Fourdrinier the contract (p. 1) provides:

"Breast-roll hung outside of shake posts; arranged so as to be raised from level to 3 inches above level."

In reference to this adjustment Lansing testified:

"The large drawing of the Raymondville Paper Co. Machine, Exhibit T, shows the adjustment required by the contract, and, in fact, it will give one-half inch more than the contract with the possibility of reaching four inches" (Rec., p. 653).

In reference to the head to be carried by this machine the contract (p. 4) provided:

"The slices to be deep, so that an 8" depth of water can be carried ahead of the first slice. No slots in the slices."

Kinney, mechanical engineer of the Bagley & Sewall Company, has explained the purpose of providing the eight-inch head, with the three-inch pitch, on the Bagley & Sewall machines (Rec., pp. 557-558). He states that "If the wire ran faster or slower than the water you get a ripple and that ripple affects the formation of the sheet;" that by using the 8-inch head and the 3-inch pitch it helped to obviate the objection of the ripple; "it brought the velocity of the water and the speed of the wire nearer together."

Kinney testified that he had worked out a table, using as a basis the table found in the Trautwine Engineer's pocket book, showing the acceleration of water in feet per minute from any given head. This table was offered in evidence as Defendant's Exhibit T-8, and was verified by the witness Carter. It has furnished the basis for all of the computations of the experts, Carter and Livermore. It has also been used by Aldrich in his rebuttal testimony (Rec., p. 121).

Kinney pointed out in his testimony that it makes no difference, in the operation of a machine of this kind, whether the acceleration of the stock is obtained by the pitch of the wire, or by the head in the flow box, or partly by pitch and partly by head (Rec., p. 564).

Kinney had already testified that in order to get satisfactory results with a paper machine, it is not necessary that the speed of the stock should be brought up to the speed of the wire.

Without professing to have any exact information upon this point Kinney testified that there could be a variation of from 50 to 100 feet or more difference between the speed of the stock and the speed of the wire, with satisfactory results in the way of making paper.

The fact that Kinney had provided himself with the table, Exhibit T-8, shows conclusively that he realized that there was a relation between the speed of the stock on the wire, and the speed of the wire, and that there must not be too great a difference between them to be overcome by the drag of the wire in order that the machine might form a satisfactory sheet of paper.

It may be noted in passing that the difference between speed of stock and speed of wire in the Bagley & Sewall Raymondville machine constructed in 1904, which must be made up by the drag of the wire, is not as great as the corresponding difference in defendant's machine, even when operated with a thirteen-an-one-half inch pitch, and is very much less than in defendant's No. 2 machine, which the evidence shows makes satisfactory paper at a wire speed of 585 f. p. m.

There was no evidence respecting these Bagley & Sewall machines before the courts in the Remington-Martin suit.

Lansing's Testimony Respecting Pitched Wires.

So far as appears in this record the Bagley & Sewall Company was the first to recognize that the speed of the stock at any given point on the wire, was determined by the amount of head carried in the flow box, plus the amount of pitch from the flow box to the point in question, and that it made no difference, in accelerating the stock, whether the vertical drop was in the head, or in the pitch of the wire. It is possible this may have been understood by many other builders and by many operators of Fourdrinier machines, but Kinney is the

first person called as a witness in this case who had prepared a table so as to enable the exact speed at any point on the wire to be ascertained under any conditions of head and pitch. We have cited Kinney's testimony in reference to the identical results obtained by varying either the head or the pitch, so long as there is no change in the vertical drop between the top of the stock in the flow box and any given point on the wire.

Lansing agrees with Kinney in this respect, and is also of opinion that a better result is obtained by using a high head and a low pitch, rather than the low head and the high pitch suggested by Eibel (Rec., pp. 658-660).

Lansing has not at any time expressed the opinion that there is no advantage in accelerating the speed of the stock to prevent too great a difference between the speed of the stock and the speed of the wire at or near the point where the stock settles upon the wire. It is his opinion, however, that a better result is obtained by using a high head and a low pitched wire, on the order, for instance, of the arrangement used with the Bagley & Sewall machines in 1904 and 1905, and such as has been employed for the past five years, since this suit has been pending, with defendant's No. 2 machine. This is made clear by Lansing's testimony on cross examination (Rec., p. 646).

While admitting that all news machines sold by his company since 1907 have been run with a pitch of at least eight inches, Lansing testified that in his opinion there is no advantage in giving such pitch to the wire (Rec., p. 663).

That Lansing is right in this position seems to be conclusively demonstrated by five years' use of defendant's No. 2 machine, and by the fact that one of the plaintiff's licensees—a stockholder in the plaintiff company—abandoned, about two years ago, the high pitched wire, on two of its machines, and substituted a level wire with a high head. The evidence respecting this change is in the record and we shall refer to it in detail later in this brief.

PEJEPSCOT PAPER MILLS 1906.

Carter's data on the diagram of the Pejepscot machines (Defendant's Exhibit W, 169, following Rec., p. 1092), which were personally examined by him (Rec., p. 909), is as follows:

Diagram No. 14. Pejepscot Paper Mills, 1906.
Paper speed 506-520 f. p. m.
Point of speed equality wire and stock 10 ft. from slice.
Total pitch 5 in.
Net pitch 2⅝ in.
Wire flat beyond first suction box.
28 ft. breast-roll to guide-roll.
Wire speed about 490.
Speed of stock due to head 295.
Speed of stock due to pitch 85.
Speed of stock due to drag 110.
Percentage of speed of stock due to pitch 17%.

The evidence respecting these machines is found in the deposition of Dickinson to whose testimony we have referred in connection with the Lisbon Falls machine.

Dickinson testifies that in 1906 he took charge of the Pejepscot mill, while retaining charge of the Lisbon mill, and since that date he has had charge of both mills; that when he took charge of the Pejepscot mills in 1906 there were two machines there, and the wires were pitched two or three inches; that he raised the pitch to that of the machines in the Lisbon mill, and he thought that one machine is a little above the Lisbon mill; that they were having the same trouble at Pejepscot from the cross waves on the paper that they were having at Lisbon, and that by raising the Fourdriniers higher the sheet smoothed out; that the Pejepscot machines are maintained at a speed of 506 and 512 f. p. m. and that "they are running as fast as we can on account of our power; we haven't any more power in our engine;" that they have run around 520 but not of late; that they could run faster if they had more power; that the Pejepscot machines were put in in 1898 and have never been

re-built, but have had new balance tube rolls this year (1917); that there has been a change in recent years in the method of producing the ground wood; that "we try to make our ground wood as good as we can to make our paper run." "We are using the Hall Process Company's method at our mills the last couple of years." That the head carried at Pejepscot, in a pond behind the slices, is about six or seven inches (Rec., pp. 731-734).

It will be seen that the Pejepscot machines are operated with substantially the same pitch as the Lisbon Falls machines, and that this pitch was adopted by Dickinson for the purpose of smoothing out the sheet and getting a better formation. As Dickinson has testified, the purpose was different from what he had in mind when he ran the wire one inch down hill to carry the stock farther down the wire (Rec., p. 736, XQs. 199-201).

No evidence respecting the Pejepscot machines was before the courts in the Remington-Martin suit.

PALMER'S FALLS MACHINES OF 1898.

The evidence respecting these machines is found in the record in the testimony of the following witnesses:

Michael Argy (Rec., pp. 430-455).

John T. Cunningham (Rec., pp. 455-474).

Wm. F. Hazel (Rec., pp. 491-524).

Noble J. Ross (Rec., pp. 367, 391, 418).

Clarence E. Kinney (Rec., pp. 553, 554, 593).

The witnesses, Argy, Cunningham and Hazel, all of whom were employed in the Palmer's Falls Mill in 1898, and for several years thereafter, all testify that one of the machines in this mill had its breast-roll end elevated by wedge-shaped blocks, and that this machine ran constantly at speeds exceeding 500 f. p. m. Shortly thereafter another machine was

raised. Ross saw one machine in July, 1898, and testified that the breast-roll end was blocked up five or six inches, and was running about 500 f. p. m. (pp. 367-368). Argy's recollection is that the blocks used for elevating this machine were at least two and one-half inches high (p. 433). Cunningham states that to the best of his recollection the blocks were three inches high (p. 458), and Hazel, who went into the mill in 1898, and ran the pitched machine, testifies that the elevation was between four and five inches, and "the elevation was obtained by placing hardwood, oak, under the legs of the Fourdrinier" (p. 497). Kinney was in this mill on September 25th, 1899, and made a memorandum in his notebook that the 90" machine was running at 512 f. p. m. and the 145" machine at 425 f. f. m. (pp. 553-554, 592-593).

The record book produced by Argy, Defendant's Exhibit D, shows that machine No. 8, which was the 90" machine produced at all times as much or more paper than the No. 7 machine which was a 122" machine (p. 437). The No. 8 machine ran at 500 f. p. m. and better, while the No. 7 machine ran at practically 400 f. p. m. (p. 433).

The purpose of blocking up the breast-roll end of the No. 8 and No. 9 machines, was stated by the witness Argy to be "in order to have the paper the same speed as the wire, as near as we can, to prevent the roughing—as we called it—it made the formation cloudy" (Argy Q56; Rec., p. 434). See also testimony of Cunningham (Q58; Rec., p. 458), and Hazel (Qs100-101; Rec., p. 498).

We think there can be no doubt but that one of these machines was pitched anywhere from three to five inches as early as 1898, and that this pitch was given to the machine for the purpose of accelerating the flow of the stock on the wire, and lessening the relative speed of stock and wire. It seems beyond question that the machine was speeded up, and was run in excess of 500 feet per minute. The memorandum made by the

witness, Kinney, in his notebook when he saw the machine on September 25th, 1899, that the 90″ machine was running at 512 f. p. m. seems to settle the matter of the speed on that date.

It is clear, we think, from the testimony of the men who were running the machine at that time, that it was well understood that by raising the breast-roll end of the wire the stock was caused to flow by gravity, due to pitch, faster than it did when the wire was level, or was run at a lower pitch. The witnesses may not have understood the "Eibel theory," and the machine clearly did not operate in accordance with the "Eibel principle," as it did not entirely eliminate the "drag of the wire," but "drag" remained an important factor in bringing the stock to the speed of the wire. The pitch of the wire did, however, accelerate the stock, and, as shown by the Carter Diagram, the stock was brought up to 490 f. p. m. by the three factors of head, pitch and drag, as in defendant's machines. The speed of the stock was due to these three factors in the proportion of 295 ft. to head, 60 ft. to pitch, and 135 ft. to drag of the wire.

There was no specific testimony respecting this machine before the courts in the Remington-Martin suit.

KING MACHINES 1901-1902.

The only information we have respecting these machines is found in the deposition of the witness Ross, manager of the Beloit Iron Works, by whom the machines were constructed. The facts stated by Ross, corroborated by the drawings and specifications produced by him, are set forth in connection with the Carter Diagram No. 12 (Rec., following p. 1092, Exhibit W), as follows:

"*Diagram No. 12. King Machines (Beloit Iron Works) 1901-1902.*
Speed per contract 30-225 f. p. m.
Pitch about ¼ in. Head (possible) 8 in.
Wire flat beyond first suction box.
25 ft. 4 in. from breast-roll to guide-roll."

This machine does not add anything of interest to the information respecting operation of Fourdrinier machines disclosed by the testimony concerning the other machines we have already discussed. It does show another instance in which the three factors of head, pitch of the wire, and drag of the wire, were all relied upon, to a greater or less degree, in a Fourdrinier machine, to accelerate the stock to the pitch of the wire.

NORTHERN PAPER MILL 1904.

This is another machine constructed by the Beloit Iron Works. The specifications under which it was built are in evidence as "Defendant's Exhibit Q-3." A blue print of the drawing of this machine is in evidence as "Defendant's Exhibit R-5" (Rec., following p. 1092, Exhibit W). The specification and the blue print were identified by the witness Ross (Rec., p. 382).

As shown in this blue print, and as disclosed by the testimony of Ross, the breast-roll end of the Fourdrinier is provided with means for elevating it so as to give a pitch to the wire. This construction is of particular interest because it shows the table rails continuous, from the breast-roll end of the machine to a point beyond the suction boxes, so that as the breast-roll end of the wire is raised or lowered, the suction boxes are moved with the table rails. Ross has fully described this construction, which is set out in the specification "Defendant's Exhibit Q-3," and is illustrated in the blue print "Defendant's Exhibit R-5" (Rec., pp. 362-363).

Ross further explained the continuous rail construction, and illustrated the same by the sketch, figure 2, Defendant's Exhibit R-7 (Rec., p. 422).

The construction of the Green Bay or Northern Paper Mills Machine is of importance because this structure is a direct and exact anticipation of claims 7 and 8 of the Eibel patent in suit.

This fact was so found by the Court of Appeals as seen by the portion of the opinion we have already quoted in this brief.

The data respecting the construction of a machine of the Northern Paper Mill is summarized by Carter (Rec., following p. 1092, Exhibit W):

"Diagram No. 13. Northern Paper Mill (Beloit Iron Works) 1904.
Paper speed per contract 125-350 f. p. m.
Pitch (about) 5 in. Suction boxes carried by adjustable rails.
15 ft. 5 in. from breast-roll to guide-roll.
With head 2-2½ in. wire speed about 325.
Speed of stock due to head 200.
Speed of stock due to pitch 108.
Speed of stock due to drag 17.
Percentage of speed of stock due to pitch 30%."

OTHER PRIOR ART MACHINES.

There is considerable evidence in the record respecting the operation of other Fourdrinier machines with pitched wires, prior to the date of the Eibel application for patent. The witness Beyerl has testified as to his early experience with such machines (Rec., pp. 255-273). John N. Davis, of the J. H. Horne & Sons Company, who was formerly connected with the Pusey & Jones Company, has described the construction and operation of the machines built by the last named company under the Savery patents. As early as 1898 the Pusey & Jones Company began building machines capable of making newspaper at the speed of 504 f. p. m. (Rec., p. 817). The first machine was known as the "Defender." Davis saw it in operation in 1898, and counted the speed at 504 f. p. m. (Rec., p. 817).

The Pusey & Jones Company got out another machine known as the "New Century," the construction of which is illustrated in the Savery patent, No. 742,239, dated October 27th, 1903 (Rec., p. 1052). The application for this patent was filed March 6th, 1903. Davis testifies that the patent was applied for dur-

ing the construction of the first machine, and from the drawings of the machine (Rec., p. 819). This machine and others like it, attained speed of from 550 to 575 f. p. m. (Rec., p. 821).

INCREASE IN SPEED OF MACHINES REVIEWED IN "HISTORY OF PAPER MANUFACTURING."

In the "History of Paper Manufacturing in the United States, 1690-1916," by Lyman Horace Weeks, published in 1916, by the Lockwood Trade Journal Company of New York, there is an interesting review (pp. 293-294) of the increase in the width and maximum speed of paper machines between the years 1867 and 1897. We quote as follows:

"Previous to 1867, the width of the widest machine was not more than one hundred inches and the maximum speed did not exceed one hundred feet per minute. At that time it was generally supposed that the limit of width and speed had been reached. In 1872 *The Paper Trade Reporter* of New York stated as a surprising fact that, while the ordinary speed of the Fourdrinier machine was from sixty to eighty feet per minute, on printing paper, there was then one machine running at the rate of one hundred and seventy-five feet per minute, producing twenty-five tons of paper weekly. Nevertheless paper-makers in Europe and in the United States still continued doubtful. Their views, as late as 1873, were accurately expressed by one writer:

> 'If every part is constructed with the utmost care, substantially and true, a machine with a wire 33 feet in length and seven drying cylinders of 3 feet diameter, can make newsprint paper at a speed of from 100 to 130 feet per minute. The width of the machines has also been increased until wires 86 inches wide are now quite numerous, and some of 90 inches and even 100 inches are in use.'

Not long after this, in 1880, a Fourdrinier was built for the mill of P. H. Glatfelter, in Spring Forge, Penn., that had a speed of two hundred feet per minute. From that time on the pace was steadily increased until, before 1897, machines one hundred and sixty inches wide had been built, an increase of sixty per cent in thirty years. There were four mills equipped with machines capable of making merchantable news-paper continuously at five hundred feet per minute, an increase of

four hundred per cent, in the thirty years that had elapsed since 1867. Those four were in the plants of the Glen Falls Paper Mill Company of Glen Falls, N. Y., the Hudson River Pulp and Paper Company of Palmer's Falls, N. Y., the Glen Manufacturing Company of Berlin, N. H., and the Willamette Pulp and Paper Company of Oregon City, Ore."

LANSING'S REVIEW OF THE DEVELOPMENT OF FOURDRINIER MACHINES.

Lansing, the president of the Bagley & Sewall Company to whose testimony we have hereinbefore referred, has given an interesting statement of the development of the Fourdrinier machine from the time he became connected with the Bagley & Sewall Company in the year 1888, at which time this company began building paper-making machines. We quote Lansing's review of the development of this machine as follows:

"Q12. Please state briefly the history of the development of the Fourdrinier machine, as constructed by the Bagley & Sewall Co., from the time of the erection of the first machine down to 1905?

A. Well, coincident with our commencing the manufacture of paper-making machinery was the development of paper-making machines of this character throughout the country. This first machine, to give you an idea, ran at 323 feet a minute and, I believe, it was the fastest machine in the world at that time; at least it was of the machines that we were able to learn of. It was very much heavier and radically superior in its construction to machines that were elsewhere in paper mills that I had an opportunity to see. The fact that it did make speed interested and, I think it is fair to say, that our ambition, if you please, was more towards speed than the broadening particular field of kinds of paper machines. It was a number of years before we built machines for any other purpose than the manufacture of news at high speed, or manilas. The progress in the matter of speed was constant; the fundamentals in the manufacture practically did not change at all, and it was the natural evolution of the machine itself in strength, in the first place, diameter of rolls, the lengthening of the wires, the lengthening of the felts, the increasing of the number of suction boxes, the raising of the ponds behind the slices, the increase in

number of dryers and at all times, almost machine to machine, the increasing strength of the machines in the driving, etc., to stand the strain of the greater speeds. This continued until approximately, I think, without any reference to dates, that in about 1898 or 1899, we had attained practically the limit of speed that the paper maker could take care of the paper at the end of the machine. There is where his trouble seemed to lay. At that time one J. J. Warren solved the problem at the winder end, and I think his patent is dated sometime in 1898 or 1899 for a two drum winder, which patent he licensed us exclusively under and for ten or eleven years thereafter we built the Warren winder for our own machines and for other machines. Almost immediately, I would say, that the speed which paper makers were able to use their machines was 50 to 75 feet higher than it had been previously. Then again commenced the improvement in the workmanship, both in strength and in minor designs for convenience in handling. For the interest of you all it is perfectly surprising the little things that the paper maker working on the machine will suggest, and many many of the good things that we have got on our machines have come from some remark that 'this is awkward, can't you make it some way different?' The improvement was quite marked and along in 1902, 3, 4, 5, 6 and 7 machines began to assume something like what we term the modern machine. This continued in 1907 and 1908, up to 1912. The increase in weight, strength, and diameter of rolls also was increased, length of wires were increased until we were building a 90 foot wire. As good an illustration as I can give you is that in 1903, I think it was, that we built a 163 inch machine with the total weight of that machine in the neighborhood of 790,000 pounds; in 1916 we built a machine three inches less in width, 160 inches, weighing 1,285,000 pounds, to be used for precisely the same kind of paper. Of course with this were refinements in all directions, in manufacture and every place and spot covered with the necessary materials for strength for fast running. I think that is about as brief a description of a very long proposition that I can give.

Q13. To what extent were you personally familiar with this development of the Fourdrinier paper-making machine for your company?

A. I was as familiar with it as anyone possibly could be with a person that made probably ninety per cent of the contracts, with fully ninety per cent of the negotiations and supervised the building and tore up the drawings when we made them, when they were not to my satisfaction" (Rec., pp. 616-618).

APPLYING ALDRICH TEST EIBEL PATENT INVALIDATED BY PRIOR ART MACHINES.

If we apply the test laid down by Aldrich in his testimony it will appear conclusively that the Eibel invention is found in a number of the prior art machines disclosed in this record. If we accept the method of differentiating between structures that do and those that do not employ the Eibel principle laid down by Aldrich, we must find that several of these prior art machines infringe the Eibel patent, or would do so if they were later than the Eibel invention.

As these machines are earlier than Eibel they must, therefore, under the rule laid down by the courts, anticipate the Eibel invention and invalidate the Eibel patent. *Knapp v. Morss*, 150 U. S. 221, 37 L. Ed. 1059; *Peters v. Active Mfg. Co.*, 129 U. S. 530, 32 L. Ed. 738; *Thatcher Heating Co. v. Burtis*, 121 U. S. 286, 30 L. Ed. 942; *Grant v. Walker*, 148 U. S. 547, 37 L. Ed. 552; *Gordon v. Worder*, 150 U. S. 47, 37 L. Ed. 993.

EIBEL PATENT CANNOT BE DIFFERENTIATED TO MERELY COVER DEGREE OF PITCH NOT BEFORE USED.

It will be noted that Aldrich, in the testimony hereinbefore specified, places the limit of pitch that will constitute the Eibel invention at five or six inches, not because there would be any difference, except a difference in degree, between a five or six-inch pitch and a lower pitch of three or four inches, but merely because pitches of three or four inches were known by Aldrich to have been in use prior to the date of Eibel's alleged invention.

Apparently Aldrich can see no difference whatever, except a difference in degree, between a four-inch pitch, which he concedes had been used before, and a five or six-inch pitch, which at the time he gave his *prima facie* testimony he thought

had not been used before, and which he stated was, therefore, within the Eibel invention.

Of course, the Eibel patent cannot be saved merely by limiting it to the lowest pitch that had not previously been employed. If a five or six-inch pitch is within the Eibel specification and claims, and there is no difference, except a difference in degree, between a five or six-inch pitch, claimed to have been first used by Eibel, and a three or four inch pitch, admittedly in common use before Eibel, and operating in the same way to accelerate the stock by gravity, only in a less degree, then the mere increase, from a three or four-inch pitch to a five or six-inch pitch, cannot confer patentability upon the higher pitch, even if it be true that such higher pitch was first used by Eibel.

CHAMPION PAPER COMPANY MACHINE WITH FLAT WIRE, 1911.

Evidence has been introduced, in this record, by defendant, respecting the machine of the Champion Paper Company of Carthage, New York. This machine was given its present arrangement subsequent to the date of the Eibel patent, and is, therefore, not a prior art structure. The machine is of interest, however, because it shows a Fourdrinier machine that has made paper continuously for eight or nine years with a flat wire and a high head, at a paper speed of about 540 f. p. m. Moreover, the testimony shows that if the machine were heavier and stronger, the speed could be increased to any desired amount.

The evidence respecting this machine is found in the depositions of Harry E. Rockwood (Rec., pp. 630-636), and H. J. Cadwell (pp. 639-645). It appears from the evidence of these witnesses that the Champion Paper Company, about 1908, adopted a fifteen-inch pitch for the wire of its Fourdrinier machine. Suit was brought against it by the plaintiff herein for infringement of the Eibel patent involved in this suit. The

Champion Paper Company thereupon adopted a flat wire and a high head. While using the machine with the fifteen-inch pitch the greatest speed ever obtained was 500 feet. After the flat wire was adopted, with the high head, the machine could be run at from 500 to 540 f. p. m. and on the date when Rockwood, superintendent of the mill, testified the machine was running 540 f. p. m. (pp. 632-634). The head on the machine, with the flat wire, has varied, according to the stock, from twelve and thirteen inches down to eight inches. On the day Rockwood testified he was using a ten-inch head (pp. 633-634).

Rockwood testified that if the mill had sufficient drying capacity he thought the speed of the machine could be increased to 600 feet (p. 633). Cadwell testified that if the construction of the machine was such as to stand the speed, and they had sufficient drying capacity, he thought there was no limitation as to the amount of speed at which the machine could be run (p. 641).

Carter, has made a diagram illustrating the arrangement and operation of this machine, which was carefully examined by him. Data representing the details of the arrangement and operation appears upon the diagram (Rec., following p. 1092, Exhibit W), as follows:

"Diagram No. 5. Champion Paper Co. (1911).
Paper speed 490-540 f. p. m.
Point of speed equality of wire and stock.
10 ft. 8 in. from slice. Flat wire.
Head 8-10 in.
29 ft. 10 in. breast-roll to guide-roll.
With paper speed 540. Wire speed about 510.
Speed of stock due to head 430.
Speed of stock due to drag 80.
No pitch employed."

This machine is a complete demonstration of the fact that there is little or no virtue in a pitched wire. Some amount of pitch, to assist in drainage, may be desirable, but it clearly is not essential. The operation of this machine goes far to sup-

port the position taken by Lansing, in his testimony, that there is no advantage in the high pitch, and that better results are obtained by using a high head to shoot the stock, at its maximum speed, on to the wire.

It will be noted, from the Carter Diagram, that the stock is not brought on to the wire at the speed of the wire, but the initial speed, due to head, at which the stock comes on to the wire is about 430 feet, while the wire speed is 510 feet. The paper speed is 540 feet. This means that the initial speed of the stock is about 84% of the speed of the wire, and that drag of the wire accelerates the stock 16%. In this instance there is, of course, no acceleration due to pitch, but the intial speed, due to head, and the drag of the wire, are the only factors operating to bring about speed equality between the stock and the wire.

VII.

DEFENDANT'S AND PRIOR ART MACHINES IDENTICAL IN OPERATION.

No Difference in Operation Between Defendant's and Prior Art Machines.

Having shown that defendant's machines do not use the Eibel theory or principle of acceleration of the stock to speed equality with the wire by a gravity feed due to pitch, Messrs. Carter and Livermore next show, by the application of the same gravity rule used by plaintiff's expert in determining that a two-and-a-quarter inch head in a flow box will produce an initial speed of the stock upon the wire of 200 feet per minute, that defendant's machines operate upon exactly the same principle as do the machines of the prior art. In other words that in the prior art machines and in defendant's machines, the equality of speed between stock and wire is brought about by three fac-

tors, (1), head in the flow box, producing the initial speed at which the stock enters upon the wire, (2), gravity feed due to pitch of the wire, which it is conceded by plaintiff the prior art machines provided to a height of at least three inches, and (3), by the drag of the wire.

In their argument in the court below plaintiff's counsel said, referring to Carter's testimony:

"But all such mathematical speculations are idle and aside from the point."

Carter's statements, however, are not mathematical speculations any more than the statement of Aldrich that under a two-and-a-quarter-inch head in the flow box the stock will enter upon the wire at a speed of 200 feet per minute.

Carter simply applies this same rule and carries it a little farther, and shows that in defendant's machine with a six-inch head (allowing one-half inch off for the slice opening) the stock will enter upon the wire at an initial velocity of 330 feet per minute; and that with a total pitch of 13½ inches on the making wire, the stock will have acquired, in flowing down the pitched wire, at a point ten feet from the slice, an additional speed of 118 feet per minute, making the flow of the stock at a point ten feet down from the slice, due to the initial head and the pitch of the wire 448 feet per minute. The stock at this point has acquired the same speed as the wire, which is clearly determined, as Carter has testified, by an inspection of the sheet. It is certain, therefore, that the drag of the wire has been effective in accelerating the stock the 137 feet per minute additional, necessary to bring it up to the speed of the wire.

There is certainly no element of speculation in this testimony. Being wholly unable to meet it, as a matter of fact, and being wholly unable to show that Messrs. Carter and Livermore are mistaken in their testimony respecting this speed and the factors that produce it, plaintiff's counsel seek to overcome

the damaging effect of such testimony by asserting that these statements are merely "*mathematical speculations.*" They are not. They are, however, "*mathematical demonstrations.*"

The testimony of Carter and Livermore, therefore, establish, beyond question, that defendant's machines do not operate in accordance with the principle set forth in the Eibel specification and claims, as in the operation of defendant's machines, gravity due to pitch of the wire is neither the sole nor the preponderating factor in bringing about speed equality between stock and wire, nor, in these machines, is the drag of the wire either an insignificant or a minor factor.

It is true, as Carter and Livermore agree, that in a machine, having the proportions illustrated in the drawings of the Eibel patent, the mode of operation described in the Eibel specification cannot be obtained. We understand these witnesses to state that there is a lack of correspondence between Eibel's specification and his drawings, and that if the mode of operation described in the Eibel specification is to be carried out in a Fourdrinier machine, a very much greater pitch must be given to the making wire than is indicated in the drawing of the Eibel patent. In fact, as Carter points out, if the machine is to be operated without any head at all (which Aldrich says may be done with the Eibel invention), and if the stock is to be brought up to the speed of the wire by gravity alone, if we assume the desired speed to be 585 feet per minute, the speed employed on defendant's machines, the wire must be given a total drop or incline of 54 inches.

Carter further testifies that if a two-and-a-quarter-inch head, giving an initial speed of 200 feet per minute, is employed, and the wire is given a twelve-inch pitch, according to the proportions illustrated in the drawing of the Eibel patent, the total effect of the initial head and the gravity speed, due to the pitch of the wire, will be sufficient to bring the stock to a speed of only 276 feet per minute, at a point nine and one-half feet

from the slice. This would be less than one-half the speed of the wire, if it is assumed that the wire is to run at a speed of 585 feet per minute.

Defendant's experts, Carter and Livermore, concur in stating that there is no difference in principle or mode of operation between defendant's machines and those machines of the prior art that employ an inclined wire.

We call attention to the testimony of these witnesses upon this point (Carter, Rec., pp. 916-917; Livermore, Rec., pp. 974-976).

We see no escape from the position taken, in the testimony above cited of defendant's experts, Carter and Livermore. Defendant's machines operate on the principle of numerous machines of the prior art, in which a fairly high head is employed, so that the stock comes onto the wire at a much higher speed than the 200 feet per minute, assumed by plaintiff's expert, Aldrich, as the initial speed at which the stock leaves the flow box, in his explanation of the operation of the Eibel patent. Instead of an initial speed of 200 feet per minute defendant employs an initial speed of from 330 to 390 feet per minute, according to whether the machine tenders carry a head of six or eight inches in the flow box. As defendant's wires are run, according to the testimony of defendant's witnesses at a speed of 585 feet per minute, the stock must be accelerated to bring it to speed equality with the wire, 255 feet per minute, if the six-inch head is used, and 195 feet per minute if the eight-inch head is used.

If defendant's machines 1, 3 and 4 are operated with a six-inch head, as illustrated by the Carter Diagram No. 3, the additional velocity given to the stock by the pitch of the wire will be at the rate of 118 feet per minute, while the drag of the wire will accelerate the stock at the rate of 137 feet per minute.

As will be observed in all of defendant's machines the principal factor in getting speed equality between the stock and

wire is the high head that is carried in the flow box, whereby the stock is brought onto the wire at a relatively high speed so that less work has to be done either by gravity due to pitch or by the drag of the wire. Eibel's idea was to get the stock up to the speed of the wire, as we have seen, by gravity due to pitch. Defendant uses the old idea of bringing the stock onto the wire at a much higher speed than contemplated by Eibel and then relies upon the drag of the wire, and to a small extent only upon gravity due to pitch, to accelerate the stock from its high initial speed to the speed of the wire at the point where speed equality between stock and wire is desired. It will be seen by an examination of the Carter Diagrams, analyzing the operation of the prior art machines in the record, that several of these machines secured fully as great a percentage of acceleration of the stock by pitch of the wire as is obtained with defendant's machines, when operating with the original pitch of 13½ inches, employed with defendant's machines 1, 3 and 4. It will also be seen that a number of these prior art machines obtained a very much higher percentage of acceleration of stock by the pitch of the wire, than is obtained on any of defendant's machines, and that one prior art machine eliminated the drag of the wire altogether.

Testimony of Defendant's Experts Comparing Operation of Defendant's and Prior Art Machines Not Questioned.

We submit that the testimony above cited, given by defendant's experts, Carter and Livermore, and asserting practical identity in operation between defendant's machines and the machines of the prior art, constituted a direct challenge to plaintiff to show by its expert, the difference in principle, and mode of operation, if any there be, between defendant's machines and these machines of the prior art. Failure of plaintiff's expert to answer this testimony, or to even state that he

disagreed with the views of defendant's experts as to the operation of these machines, amounts, as we view it, to a concession of the correctness of the position of defendant's experts *in respect to this question*. Aldrich merely asserts, contrary, as we view it, to his original testimony in this case, and contrary to the theory upon which the Remington-Martin case was tried and decided that,

"There is no question in my mind but that substantial benefits may accrue where a substantial pitch is employed, and yet the effects of the pitch expressed in feet per minute does not preponderate over the effect due to the wire" (Rec., p. 123).

We have no doubt as to the correctness of this statement, as a matter of fact, and the statement of Aldrich is, as we view it, a concession that the prior art machines that used a pitch of three or four inches, or even less, did obtain a substantial acceleration of the stock, which undoubtedly brought about an advantage in smoothing it out upon the wire, even though the drag of the wire had a preponderating effect over the pitch in accelerating the stock to speed equality with the wire.

Aldrich does not question the position, taken by Carter and Livermore, that there is no difference in principle between the operation of defendant's machines, and the machines of the prior art; and that by no possible method of reasoning can defendant's machines be held to be within the scope of the Eibel patent without these prior art machines, by the same process of reasoning, being also included within the scope of the Eibel patent. Any such process of reasoning would, under the familiar rule, "*That which infringes if later anticipates if earlier*" necessarily invalidate the Eibel patent.

VIII.

OPINION OF DISTRICT COURT ON QUESTIONS OF INVENTION AND INFRINGEMENT.

District Court Found Invention in Difference in Degree.

The District Court found in effect that a mere difference in degree of pitch on the making wire of a Fourdrinier machine produces a patentable invention. We do not mean that the court expressly finds that a difference in degree is patentable but we say that this is the effect of its decision in this case.

The court found that Eibel made a patentable invention by giving the making wire of a Fourdrinier machine a "substantial" pitch. The court says:

"A pitch of 2 or 3 or 4 inches would not be enough" (267 Fed. 854).

Plaintiff's expert says:

"XQ223. And, as I understand you, referring to claim 1 of the Eibel patent, a 'substantial' elevation above the level for the paper making wire means an elevation of 5 inches or more?

A. Yes" (Rec., p. 68).

We thus have the unqualified statement of the District Court that a 4-inch pitch on the making wire is not a "substantial" pitch and not within the Eibel patent, and the equally unqualified statement of plaintiff's expert that a 5-inch pitch is a "substantial" pitch, and is the Eibel invention.

In this connection it is to be borne in mind that the only reason that plaintiff's expert gives for holding that a pitch of less than five inches is not a "substantial" pitch, is that such pitches have been used prior to the Eibel invention. Aldrich says:

"A. I hardly think that 4 inches could be considered as a substantial pitch.

XQ134. Why not?

A. Because Eibel in his specifications attempts to differen-

tiate the pitch he has in mind and what had been previously used when he specifies that it is to be substantial" (Rec., p. 53).

In other words what had been used before Eibel was, according to this expert, not "substantial," merely because it had been used, while anything that had not been used before Eibel is to be considered a "substantial" pitch.

That the difference between a four-inch pitch, which the District Court says is not the Eibel invention, and a five-inch pitch, which plaintiff's expert says is the Eibel invention, is a mere matter of degree, is shown beyond question if we determine from the Trautwine table, "Defendant's Exhibit T-8," the exact difference in speed that will be produced at the same point on the making wire, and with the same head in the flow box, by a four-inch pitch and a five-inch pitch.

If we assume a machine operated with a two-and-a-quarter-inch head and a four-inch pitch, we find that the stock will have an initial speed as it enters upon the wire, as testified by Aldrich, of substantially 200 feet per minute, and, at a point one-third the distance down the wire from the flow box, the speed will be accelerated to 260 feet per minute. In other words the acceleration of the stock, by this amount of pitch, from the point where it enters upon the wire to a point one-third the distance from the slice towards the guide-roll, where the stock and the wire must have substantial speed equality, is 60 feet per minute.

The District Court says that a four-inch pitch, which will accelerate the stock that enters upon the wire at a speed of 200 feet per minute, so as to bring it up to a speed of 260 feet per minute (in other words increase its speed 60 feet per minute) is not a "substantial" pitch, and is not within the Eibel invention.

Now let us see what the effect will be on the same wire, with the same head, in using a pitch of five inches, which plaintiff's

expert says is a "substantial" pitch, and within the Eibel invention.

Using the same initial speed of 200 feet per minute for the stock entering upon the wire, we find that if the making wire is given a pitch of five inches, instead of four inches, the stock will attain a speed at the same point on the wire of 275 feet per minute. In other words using a machine having a two-and-a-quarter-inch head in the flow box, and a four-inch pitch (which is conceded to be prior art, and is asserted not to be within the Eibel patent), we find that the stock will have a speed due to the initial head, plus the accelerating effect of the pitch of the wire, of 260 feet per minute at a point one-third the distance down the wire; and the same machine, operated with the same initial head, with a five-inch pitch of wire, will have at the same point a speed of 276 feet per minute. A machine so operated, which it is said will embody the Eibel invention, will, therefore, have the stock accelerated by gravity due to pitch, 75 feet per minute, while a machine having the old, or prior art, four-inch pitch will have its stock accelerated under the same conditions, 60 feet per minute—or 15 feet per minute less.

It is, therefore, beyond question that the District Court has held that a mere difference in degree, resulting from a difference in pitch of the making wire of a single inch, constitutes with Eibel a patentable invention. The court finds that a four-inch pitch is not a substantial pitch; does not constitute the Eibel principle, and its prior use does not anticipate Eibel; and plaintiff's expert testifies, and his testimony has nowhere been disclaimed, or repudiated by plaintiff's counsel, that a five-inch pitch is a "substantial" pitch, within the Eibel invention, and produces the results called for by the Eibel patent.

As we have already stated, in determining whether the Eibel patent does or does not disclose a patentable invention, comparison must be made between the operation of a machine hav-

ing a five-inch pitch, which plaintiff's expert says is Eibel, and the two, three or four-inch pitch, which the trial court, and plaintiff's expert, find in the prior art, and which they both say is not Eibel.

The former pitch, with the head, plaintiff's expert adopts as the usual head in use at the time of the alleged Eibel invention, gives a speed of 260 feet per minute, at a point one-third down the making wire from the slice.

This, we are told, is prior art, not the Eibel invention.

The other pitch—the five-inch pitch—with the same head, produces, at the same point on the same making wire, a speed of 275 feet per minute—fifteen feet more than is produced by the four-inch pitch at the same point.

This, it is asserted, is not prior art; is a "substantial" pitch, and is the Eibel invention.

If patentability was ever before hinged upon such a slight difference in degree, in any case decided by a federal court, we fail to have had the same called to our attention.

District Court Found Infringement in Defendant's Machines 1, 3 and 4.

Having, as we submit, erroneously found that the Eibel patent in suit discloses a patentable invention over the Barrett & Horne patent No. 691,333, and over the various machines of the prior art, the District Court held defendant's machines 1, 3 and 4, as now operated, and all of its machines, as they were operated at the time of the beginning of this suit, to be infringements of the claims of the Eibel patent.

The court rejected defendant's contention that the Eibel patent requires the wire to be given such an elevation that gravity alone, due to the pitch of the wire, would cause the stock to attain the same speed as the wire at the point where the stock would lose its fluidity and settle down upon the wire in a thin

sheet. The court did not find it to be even necessary, under the Eibel patent, for gravity, due to the pitch of the wire, to be the *preponderating* factor, as plaintiff's expert testifies it must be, in bringing the stock up to the speed of the wire. The court found that to use the Eibel invention, it is only necessary to use gravity due to pitch in conjunction with "drag" and with "head."

The evidence shows beyond question that in all prior art machines the stock was necessarily brought to the speed of the wire by the time it had substantially lost its fluidity and settled upon the wire. The plain reading of the Eibel patent is, as we have pointed out, that the paper-making wire is to be given such an elevation that the stock is caused by gravity to travel at the speed at which it is desired the machine shall run, and that the machine is *then* to be speeded up "to cause the wire to travel at substantially the same rate of speed as the rapidly moving stock." The English language could not make it plainer, that this is the intention of the patent, than is done by the Eibel specification and the claims, particularly by claim 2 of the patent.

The District Court, however, completely disregarded the language of the claims and the specification, and as completely disregarded the testimony of plaintiff's expert to the effect that in any Eibel installation gravity, due to the pitch of the wire, must be the "preponderating" factor in bringing about speed equality between wire and stock, and that in any such installation the drag of the wire is "insignificant."

It is believed, therefore, that there is no possible ground for upholding the decision of the District Court wherein it found that all that is required in the Eibel patent is that gravity due to pitch be superimposed or added to the factors of "head" and "drag" in bringing about speed equality between stock and wire. The decision of the court practically held that if gravity *is used to any extent*, in addition to "head" and "drag,"

the Eibel patent is employed. The District Court treated Eibel as a basic or pioneer inventor, or discoverer of the use of "gravity," as a factor in securing speed equality between stock and wire, or in other words in reducing the relative speed of the stock and wire, because the court said:

"Eibel introduced a new speed-making factor. He proposed to bring the speed of the stock up to the speed of the wire, and to use gravity to that end" (Rec., p. 190; 267 Fed. 855).

This statement is erroneous. Eibel was not the first to introduce gravity (either gravity due to pitch or otherwise), as a factor in bringing the speed of the stock up to the speed of the wire.

Of course, "head" is gravity. And the depth of the head in the flow box determines the speed at which the stock enters upon the wire. As we have pointed out, it makes no difference whatever in securing speed equality between stock and wire, whether gravity is obtained by the "head" of stock in the flow box or by the pitch of the wire.

In the prior art machines gravity was used as a means of bringing the stock up to the speed of the wire. It is true that in these machines a relatively high head was employed, and the greater part of the gravity effect came from the depth of stock in the flow box, but it is conceded that so far as the "speeding up" of the stock is concerned, it makes absolutely no difference whether the gravity effect is obtained by the depth of the stock in the flow box, or the pitch of the wire (Aldrich, p. 45).

Thus the Bagley & Sewall contract for the Raymondville machine in evidence as Defendant's Exhibit T-11, which is dated March 5th, 1904, provides for a three-inch pitch of the wire, and an eight-inch head in the flow box. This, as we have heretofore pointed out, is the equivalent of a two-inch head in the flow box, and a twenty-one inch pitch on the wire. In other words, an eight-inch head in the flow box with a three-inch

pitch of the wire gives exactly the same speed, at a point one-third of the distance down the wire from the flow box, as a two-inch head in the flow box, and a twenty-one-inch pitch of the wire will give at the same point.

That the builders and users of the earlier machines did use gravity obtained both by the "head" and the "pitch" of the wire to speed up the stock, cannot be doubted, although many of these users recognized the fact that by pitching the wire they also got an advantage in a better drainage, which Aldrich says is one of the advantages derived from the pitched wire of the Eibel patent, although apparently Eibel did not recognize this drainage advantage, or at least he says nothing about it.

In the testimony we have noted from the users of prior art machines, it is made clear that they recognized the "speeding-up-of-the-stock" advantage, derived both from the "head" and the "pitch" of the wire, as well as the drainage advantage.

Bayless testifies that the paper maker who proposed the first pitched wire to him said he had seen a machine "running with a pitched wire which got the stock down at the same speed that the wire was running at, and you could carry plenty of water down with it and get a better formation" (Rec., p. 703).

Here there was recognition both of increase of speed from gravity, due to pitch, and better drainage.

In reference to the new machines ordered from Horne, Bayless said:

"We had found that the machine at Binghamton worked quite satisfactorily with a certain amount of pitch. *We proposed to run these machines at a much higher speed than the Binghamton speed and consequently I wanted more pitch than I had on the Binghamton machine for light weight paper*" (Rec., p. 705).

Bayless gave the reason for wanting more pitch as follows:

"Because we could get a much better formed sheet by reason of running the stock on the wire at practically the same speed

of the wire, and get the water well down to the suction box enabling us to make a better formation of the sheet" (Rec., p. 705).

The fact that Bayless got in addition to a higher speed a better drainage effect is exactly what Aldrich testifies is obtained with an Eibel installation.

Certainly with this uncontradicted testimony in the record it cannot correctly be said that Eibel "introduced a new speed-making factor," consisting of gravity, either obtained from a "head or from a pitched wire." Bayless in his machines had both a "head" and a "pitched wire," and he got gravity from both, and increased the speed of his machines thereby.

The same is true of the Kimberly-Clark machines of 1904, the Niagara machine of 1904, the Lisbon Falls machine of 1902-5, and the Bagley & Sewall machines of 1904, to say nothing of others discussed in testimony which we have hereinbefore referred to. In all of these machines gravity, both from head and pitch, was used as a factor in obtaining speed, and it is certain that the District Court was mistaken in saying that "Eibel introduced a new speed-making factor" and used "gravity to that end."

DECISION OF DISTRICT COURT RESPECTING EVIDENCE OF PRIOR USES.

In its decision the District Court said:

"Evidence was offered by the defendant tending to show a pitch of 4 inches or more, and that such pitch was used for purposes which might be held to be within the Eibel patent. After examining this testimony, I find it insufficient to establish either the date or other substantial facts with reference to this alleged prior use. * * * After a careful study of all the evidence offered by the defendant to prove anticipation, either in patents or by a prior use, I am led to the conclusion that no one of the prior inventors or alleged users, disclose any of the inventive purpose of Eibel. No one shows any knowledge of

any relation between the pitch of the wire and speed, or of the use of gravity to aid the other elements in well-known use before Eibel" (Rec., p. 185; 267 Fed. 852).

In reference to this portion of the decision of the District Court defendant submits:

(1) The uncontradicted testimony of Bayless and other witnesses respecting the Bayless-Austin machines establishes conclusively that these machines were operated with the making wires elevated at four inches, and more, at dates long prior to the Eibel invention; the date when these machines were constructed is shown by the contract, between Bayless and J. H. Horne & Sons Co. (Defendant's Exhibit V-4), the drawings of the machines (Defendant's Exhibit V-5), and the correspondence respecting the same (Defendant's Exhibits V-2 and V-3). The drawings themselves show that the machines were capable of having the breast-roll end of the making wire raised at least four inches (Rec., p. 783, XQ279; p. 811, RDQ495).

We submit further in reference to these Bayless-Austin machines, constructed by Horne & Sons, under the Barrett & Horne patent No. 691,333, that the testimony of Bayless and of his employees Anderson and Brown, respecting the dual purpose of speed and drainage, obtained from the pitched wire, cannot be disregarded (Rec., pp. 705, 694).

(2) The date of the construction of the Kimberly-Clark machines is fixed absolutely by the contracts and drawings produced by Ross (Defendant's Exhibits M, N, O, P, Rec., pp. 354-355), and the drawings and folder produced by White (Defendant's Exhibits U-1 and U-2, Rec., pp. 601-602).

White testified, and his testimony is borne out by the drawings, that all of his original machines were designed for a pitch of anywhere from two to four inches; could be adjusted four inches without any difficulty, and "If they wanted to strain a couple inches more, by a little tinkering in the mill, they could do it" (Rec., pp. 628, 629, 630).

Thom testified positively, and he is not contradicted, that these machines are still operating with the original screws. Thom also testified that when the machines were first installed they were given an elevation of four inches, and in 1910, they were raised two inches more, by the same adjusting means, in which condition they are now being operated (Rec., pp. 330-332).

While Thom did not state the purpose of pitching the wire in the same technical language, used by Eibel and plaintiff's expert, that he understood the relation between pitch and wire and speed there can be no question. This witness stated that with a level wire and a high speed "the natural tendency is for the wire to draw away from the flow of the pulp," and that they got a better formation of the sheet by pitching the wire so that "we would be relieved of the drawing of the pulp as it entered onto the wire," and "we thought we would get a better formation by raising the Fourdrinier, so as to help the flow and velocity of the pulp" (Rec., pp. 332-333).

White produced a list showing a large number of machines having a pitch adjusting device like that used in the Kimberly-Clark machines, and disclosed in the folder "Defendant's Exhibit U-2" (Rec., following p. 1088). He stated that all of these machines were capable of having the wire pitched from two to four inches, and could be elevated "if they wanted to strain, a couple inches more." Although White named a large number of his machines, and the owners thereof, and, so far as appears, these machines are still in use, plaintiff made no effort to rebut the testimony of White as it should have done if it desired to contradict his testimony, by proving that the machines could not be elevated four inches. As White produced the drawings of the machines, and a list of the sales and stated positively that all of them could be elevated four inches, with the devices provided on them, and could go two inches more if necessary, it is submitted that this uncontradicted testimony

cannot be set aside or disregarded, as was done by the trial court in this case. Plaintiff's failure to produce evidence to show that the Moore & White machines, widely scattered over the country, are not capable of the adjustment testified to by White, is an admission that his testimony is true. Undoubtedly plaintiff has examined these machines since White testified, and if his testimony respecting them could have been impeached or contradicted witnesses would have been called for that purpose.

(3) Plaintiff in argument in the courts below repeatedly asserted that the evidence as to the Lisbon Falls and other machines is insufficient under the authorities against mere recollection testimony. The District Court accepted plaintiff's argument upon this point.

But those authorities in machine cases are where the machine no longer exists and where there is no record of it. They have no application to the Bayless-Austin, the Kimberly-Clark, the Lisbon Falls, or the Pejepscot machines, which have been continued in use ever since they were installed, and are still being used; and while the Bayless-Austin machines were damaged and repaired, the evidence is positive that no change has been made at any time in the Kimberly-Clark, the Lisbon Falls, or the Pejepscot machines.

Dickinson produces his memoranda respecting the Lisbon Falls machines and shows the date when he first put under these machines the two-inch blocks. This testimony is accepted by plaintiff's counsel and the trial court as establishing the date of the use in the Lisbon Falls machines of the two-inch blocking. Dickinson's diary shows that the two-inch blocking was applied in June, 1902.

These machines, however, had an inch and a half adjustment provided on them by means of screws, and Dickinson testifies that he used, with the two-inch blocks, an inch adjustment from the screws. This gave him in June, 1902, a total three-

inch pitch. In 1904 or 1905, Dickinson substituted the present three-inch blocks for the two-inch blocks put under the machine in June, 1902. As thus pitched the machines have been used ever since and are being used today.

In view of these facts it is no strain on the recollection for Dickinson and Hall to say that the use of these machines with the four-inch pitch has been continuous as it is today. If it were not so plaintiff could have produced witnesses to the contrary. Its failure to do so is an admission of Dickinson's testimony. Under such circumstances the number of witnesses is immaterial, under all the authorities.

Quoting from the testimony of the witness, Hall, the District Court said, respecting the Lisbon Falls machine:

"There was a pitch of 2 inches used on these machines before the Eibel patent. This use was clearly for 'carrying the water nearer to the suction boxes' " (Fed. Rep. 267, p. 852).

Hall is clearly referring here to the time *before* the blocking was employed, and when the wires were given a small amount of pitch, by means of the adjusting screws provided on the machine. This is exactly in accordance with the testimony of Dickinson, who says that he used this pitch obtained by the adjusting devices on the machine, for drainage purposes, but that when he got the higher pitch by means of blocking he had an additional purpose in view. This is clear from Dickinson's testimony, on cross examination, from which we quote as follows:

"XQ194. Now, you said that when you were using that adjustment, prior to the time you put in the shims, you ran the wire up hill with heavy manila papers and down hill when you were using a high per cent of sulphite stock?

A. Yes, sir.

XQ195. Why was that, what was the reason?

A. The water would leave the sheet with high percentage stock near the slice and I wanted to carry it down.

XQ196. Through the suction boxes?

A. Towards the suction boxes.

XQ197. You mean that the stock with a high per cent of sulphite was free?

A. Was free, very free.

* * * * * * *

XQ199. And the purpose for which you used the blocking was the same that led you to use the down hill adjustment on the two machines before you put in the blocking?

A. *I used the blocking when we built over to stop the cross waves we were having on the sheet.*

XQ202. Well, I want to know whether the purpose that you had in mind in putting those shims under was the same purpose that you had in mind when you ran the wire one inch down hill without a shim, or whether it was a different purpose?

A. *It was a different purpose*" (Rec., pp. 736-737).

Dickinson here makes it clear that when he blocked up the machines he did not do it merely for the purpose of helping the drainage, although he had previously given them a small amount of pitch, by means of the adjusting screws on the machines, for the purpose of carrying the stock farther down the wire towards the suction boxes. This, however, was before the machines were blocked up. When they were given the higher pitch, by means of the blocking, the purpose he had in mind was identical with the purpose of Eibel, that is, to get rid of cross waves in the sheet, and to cause the sheet to smooth out on the wire. Dickinson not only states, on cross examination, that his purpose in blocking up the machines was additional to getting a drainage adjustment, but he had previously made this fact very clear upon direct examination where he pointed out that when he began to run on news he was troubled with cross waves on the sheet; that these cross waves made heavy and light streaks on the paper, and that he remedied this by raising the machine up, and that after he blocked up the machine the sheet was smoother, more uniform; it stopped the cross waves and the make-up of the paper was better, more even (Rec., p. 512, Qs310-311; see also p. 736, XQ199).

Again, Dickinson makes it clear that in blocking up the machines at Pejepscot he did not do it on account of the drainage,

for he states expressly that they were having at Pejepscot, when he went there, the same trouble that they had been having at Lisbon—the cross waves on the paper. He further says that by raising the Fourdriniers higher, the sheet smoothed out (Rec., p. 732).

It is plain, therefore, that the District Court was in error when it stated that the purpose of blocking up the machines at Lisbon Falls was solely "for carrying water nearer the suction boxes."

Nor is it true, if defendant's witnesses are to be believed, and no attempt has been made either to impeach or contradict them, that the only purpose in pitching the wires in several of the other prior art machines, was to get a better drainage effect by causing the stock to go farther down the wire towards the suction boxes. This is particularly so of the Bayless-Austin machines, the Kimberly-Clark Niagara machines, the Kimberly-Clark machines at Neenah, and the Palmer's Falls machines.

While it may be, and undoubtedly is true, that in each of these instances the pitching of the wire gave better drainage, by carrying the stock farther down the wire towards the suction boxes, and this was one of the purposes in view in employing the pitched wires, it was not the only purpose.

The District Court was also in error in stating that:

"There is no indication that the patents (referring to Barrett & Horne) seek to increase the speed of production. I think this may also be said of the alleged prior use at Lisbon Falls" (267 Fed. 852).

The evidence shows that the Barrett & Horne patent No. 691,333 was based upon the machine built for Bayless in 1901. The patent drawings are substantially duplicates of the drawings made for the Bayless machine (Defendant's Exhibits V, V-5, V-6, V-10, V-12, V-13, V-14 and V-8), and the testimony of Mr. Bayless, to which we have herein referred, shows clear-

ly that the very purpose he had in mind in contracting for the machine with means for varying the pitch of the wire, was to enable him to increase the speed of his machine, as Bayless says:

"We proposed to run these machines at a much higher speed than the Binghamton speed, and consequently I wanted more pitch than I had on the Binghamton machine for light weight paper" (Rec., p. 1105).

Dickinson also makes it clear, in his testimony, that he wanted to increase the speed of his machines as well as to get rid of the cross waves. With the pitched wire Dickinson was able to run as high as 569 feet without getting any cross waves in the sheet. Later he had to slow down to from 530 to 540 feet, which is as high as he can run with his present power. Dickinson attempted to speed up his machines and got cross waves in the paper, then he blocked up the machines and gave the wire a pitch, and he could then make paper at the higher speed without the cross waves, as good as that which before the blocking up was made at the lower speed.

We submit, therefore, that as respects the Bayless-Austin, Kimberly-Clark, Lisbon Falls and the Pejepscot machines, it is conclusively shown that there is a relation between the pitched wire and the speed of the machine, and also that as to these machines which are now in existence and which have been continuously operated without change since prior to the alleged Eibel invention, the statement of the trial court in its opinion that the evidence "is insufficient to establish either the date or other substantial facts in reference to this alleged prior use," is erroneous and is not justified by the record.

In this connection it may be stated that defendant has not claimed for the Bagley & Sewall machines a greater pitch than three or three and one-half inches. The contract between the Bagley & Sewall Company and the Raymondville Paper Company dated March 5th, 1904, provided for a three-inch elevation above level, giving a three-inch pitch to the wire, and an

eight-inch head (Defendant's Exhibit T-11).

Lansing testified that the adjustment shown in the drawing, Exhibit T, would give one-half inch more pitch than the contract called for, with a possibility of reaching four inches (Rec., p. 653, Q55).

As to this machine, of course, there can be no question about the date. That is fixed by the contract, and as we have shown in former pages of this brief the three-inch pitch, on the Bagley & Sewall machines, was used with an eight-inch head, giving the same effect in speeding up the stock to equality with the wire as a two-and-one-quarter-inch head and a twenty-inch pitch. The Bagley & Sewall machines permitted just as great speed, with the same relative speed of stock and wire, as an Eibel installation with a two-and-a-quarter-inch head in the flow box, and a twenty-inch pitch of the wire. The fact, as testified by Lansing that these machines ran continuously at 500 feet per minute, and better, furnishes positive proof that with these machines there was a direct relation between the gravity feed, obtained by the combination of head and pitch, and the speed of the machine.

IX.

OPINION OF CIRCUIT COURT OF APPEALS DIRECTLY CONTRARY TO FINDING OF DISTRICT COURT.

Circuit Court of Appeals Finds No Invention in Difference of Degree.

We have in previous pages of this brief quoted quite fully from the opinion of the Circuit Court of Appeals in this case for the purpose of showing that this court has held directly contrary to the finding of the District Court that merely changing the pitch of a Fourdrinier machine from the 3 or 4 inches of the prior art, to 5 or 6 inches or more, contended by plaintiff

to embody the Eibel invention, is a mere unpatentable difference of degree.

In the opinion of the Court of Appeals (Rec., p. 199), it is also said:

"The evidence shows, and it is plain on elementary principles, that pitch and head are nothing but gravity applied to the liquid stock in two slightly different ways. The uncontradicted expert evidence shows, that, ignoring friction * * * the speed of flow attained by water in running down hill is the same as the speed of velocity under which water will be discharged from an orifice under a hydraulic head equal to the vertical height of the hill."

After analyzing the relative speed of stock and wire obtained by the use of the different pitches employed by defendant, the Court of Appeals says:

"Now, in the typical use of alleged infringement, the wire on the defendant's machine was said to be moving at a rate of 585 feet per minute. With a machine so operated, and assuming a 3-inch head and a 3-inch pitch, both prior art, the speed induced by gravity from both head and pitch would be 276.6 feet, leaving to be made up by the drag of the wire 308.4 feet. But if, instead of a 3-inch pitch a 6-inch pitch be used (an alleged infringement) with the same head, gravity from such head and such pitch would produce a speed of 308.4, leaving to be made up by the drag of the wire 276.6. The contention then is, that, by increasing pitch-induced-gravity-speed by 31.8 feet, the plaintiff's patent monopoly is invaded. Otherwise stated, reducing the speed induced by the wire from 308.4 feet to 276.6 feet involves infringement" (Rec., p. 200).

"It follows irrefutably that, for most purposes now under discussion, head and pitch are interchangeable methods of applying the same force, viz.: gravity as a speed-producer on the liquid stock upon the wire screen. It also follows, and is admitted by the plaintiff, that all of the pitches used by the defendant or by the licensees under the plaintiff's patent fell far short of eliminating drag as a speed-producing factor. Indeed, in the uses complained of by the plaintiff as infringing, drag remains a force nearly equal to, if not greater than, gravity due to pitch as a speed-producer" (Rec., p. 201).

"On this showing, even if the patent is valid, there is no infringement, except on the theory that the patent covers any substantial use of pitch to decrease the drag on the wire. If the

patent means, as the Court of Appeals for the Second Circuit apparently held in the Remington-Martin case, 234 Fed. 624, that pitch adequate to bring the stock to speed equality is Eibel, there is no infringement. It would take a 48-inch pitch with a 2-inch head to relieve the wire of all drag. Even if the patent means that pitch must be the predominating force, there is no infringement; the defendant's predominating force is head.

* * * * * * * * *

We have not found it necessary to review in detail the great mass of evidence concerning prior uses, for, in the view we take of the case, the plaintiff's own admissions as to the nature and extent of 4 or 5 inch prior uses conclude the point in the defendant's favor.

Plaintiff's expert testifies that he hardly thinks 'that 4 inches could be considered as a substantial pitch. *Q.* Why not? *A.* Because Eibel in his specification attempts to differentiate the pitch he has in mind from what had been previously used when he specified that it is to be substantial.'

We cannot accept the theory underlying this testimony. It amounts to saying that a 5-inch pitch is not 'substantial' merely because the witness had discovered that 4-inch pitches had been in common use before Eibel. But it is plain that the difference between no pitch and a 4-inch pitch is as great as the difference between a 4-inch pitch and an 8-inch pitch" (Rec., pp. 201-203).

ACCIDENTAL USES.

At the argument of the case in the lower courts, plaintiff advanced the surprising theory that the prior uses shown in the record herein, can be ignored on the "accidental" theory, citing such cases as *Tilghman v. Proctor*, 102 U. S. 711. We say this is surprising because it is such a total misapplication of the law of accidental use as to create surprise that our adversary should have suggested it. It is even more surprising that this suggestion should have prevailed with the trial court, as it appears to have done from the following statement which we quote from the opinion:

"If, in using the pitch for drainage, some slight advantage was obtained in reference to equalizing the speed of the stock to that of the wire, it was clearly an unexpected and unap-

preciated result. And it is clear that such result is not sufficient to constitute infringement. *Tilghman v. Proctor*, 102 U. S. 707, 711, 26 L. Ed. 279."

Since at Lisbon Falls Dickinson blocked up the head of his machine by half-inch shims or wedges (Rec., p. 728, Q61), and later increased it by two-inch shims (stated in his memorandum book as June, 1902; p. 511, Q70), and still later inserted three-inch shims (p. 729, Q76), so as to finally block it up four inches, the putting of these blocks under the head, and the pitch produced thereby, was certainly not "accidental." He put them there deliberately and for a purpose, and that purpose could have been no other than to obtain the pitch which necessarily resulted from the blocking up. It is absolutely absurd to call this pitch "accidental" when Dickinson put the blocks under there for the very purpose of getting it, and it would be just as absurd to say that Dickinson could now be enjoined from using the pitch which he created about 1902, and has had in use ever since.

The fact that the putting of the blocks under the Lisbon Falls machine and the consequent pitch, were not accidental is further shown by the fact that Dickinson, before he could have obtained any knowledge of the Eibel invention, also blocked up a second machine at Lisbon Falls, and the Pejepscot machines, which have remained so ever since, and were also seen at the time the testimony was being taken, and found to contain a total pitch of five inches (p. 910). So that in answer to the statement that Dickinson's blocking up and pitch were accidental, and obtained "an unexpected and unappreciated result," as said by the trial court, is the fact that he did it on four machines (two at Lisbon Falls and two at Pejepscot), to get the very result he obtained, and they have been so used ever since.

The machines in use at Lisbon Falls today are, therefore, as truly prior art machines as anything could possibly be, and as

far from being accidental machines. Their pitch was intentional, has always continued to be intentional, and is still intentional, and whatever mode of operation resulted from the pitch, Dickinson used, he is entitled to use, and the public as well, despite any subsequent invention of Eibel.

Dickinson knows best why he put those blocks under there, and has stated (Rec., p. 730, Qs87-93) that it was to stop waving or rippling and to smooth the stock, and that it did accomplish this result. That it did, and does, accomplish this result is absolutely confirmed by the machines themselves, as anyone who goes to Lisbon Falls, or Pejepscot, can see, and as testified to by Carter (Rec., pp. 908-910), without contradiction.

Respecting the defense of accidental uses, the Court of Appeals in this case said:

"Accepting fully the doctrine, we think it is not applicable to the situation here disclosed. Plaintiff's own expert admits that 'the effect of gravity was always there regardless of how small the pitch was.' Compare *Brown v. Piper*, 91 U. S. 37, 41; *Westinghouse v. Boyden Power Brake Co.*, 170 U. S. 537, 555; *Risdon Iron Works v. Medart*, 158 U. S. 68.

It is incredible that a skillful operator of one of these great machines would have used a 3 or 4-inch pitch, with or without a substantial head, without paying some attention to the increased speed of the stock thereby induced. We agree with the contention of defendant's counsel that intelligent men in charge of such a machine could not operate it without discovering that commotion, ripples, and 'wildness' in the paper would result if the wire traveled at a speed relatively much faster than the speed attained by the stock through head and pitch, one or both. But the direct and affirmative evidence shows that there was prior appreciation of the principle which Eibel now claims as his own discovery.

Patentees frequently obtain advantages in their patents which they did not discover. The principle applies to prior art uses. Compare *Scaffolding Co. v. Chain Belt Co.*, 254 U. S. 32, 37, where Mr. Justice McKenna said:

> 'We yield to the assertion of counsel that he (the patentee of the patent in suit) cannot be deprived of an advantage because he did not discern it, but the same con-

cession must be given to Murray (a prior patentee). He (Murray) was entitled to all of the benefit that he claimed for his device, *or that can be given to it by formal charges.*' (Italics ours.)

See also *Ansonia Brass & Copper Co. v. Electrical Supply Co.*, 144 U. S. 11.
Penn. R. R. v. Truck Co., 110 U. S. 490.
Blake v. San Francisco, 113 U. S. 679.

It is true that to change the pitch of the machine was a somewhat troublesome and cumbrous undertaking,—such that an operator would not as matter of common and daily occurrence experiment with varying pitches; but it is also true, as pointed out above, that head was, for most purposes sought to be attained by the alleged Eibel invention, the equivalent of pitch; and that the record shows that operators were frequently experimenting with different heads. They must, therefore, have observed the action of the stock on the wire at different rates of gravity-induced speed.

Even if, as the plaintiff contends, gravity applied through pitch gives a smoother and more even movement, and thus produces a better quality of paper, than when applied by head, yet, so far as relative velocity with the movement of the wire is concerned, the results would be the same. At most, the distinction between a head-induced speed and a pitch-induced speed was one of slight degree in the amount of commotion arising in the flowing and draining stock.

Besides, as already sufficiently indicated, Eibel does not claim a patent on the distinction between pitch-induced speed and head-induced speed. He ignores the existence of head-induced speed."

X.

DRAINAGE AND SPEED.

PITCH OF WIRE IN ANY MACHINE SERVES DUAL PURPOSE OF DRAINAGE AND SPEED.

Much was made in argument in the courts below of the statement of defendant's expert, Livermore, that the purpose of the breast-roll adjustment in the Barrett & Horne patent was not the same as the purpose of the breast-roll adjustment in the Eibel patent in suit, and Livermore's testimony upon this point

was quoted in plaintiff's brief, but plaintiff left out an essential part of Livermore's answer, and omitted it in reading this answer of the witness to the court. We quote the full question and answer, printing in italics the portion plaintiff's counsel omitted:

"XQ94. In the Barrett & Horne patent, No. 634,228, which you have previously referred to, there is a statement of the purpose of the breast-roll adjustment provided in the machine at page 1, lines 26 to 30, and that I take to be substantially what you refer to in your answer to XQ78. Does this purpose have anything in common with the theory of the Eibel patent?

A. I should say not. It looks to me as if Barrett and Horne referred to the adjustment of inclination with one effect in mind, and that Eibel referred to like adjustment with another effect in mind.

Of course, whatever effect the adjustment will produce will be just the same whether an operator had that particular effect in mind or not in making the adjustment.

In this particular case, the two effects have, so far as I can see, no special correlation to one another, and an adjustment made with one effect in mind might or might not produce a desirable effect as to the other function or phenomenon" (Rec., p. 994).

This statement, taken as a whole, therefore, is in entire accord with Livermore's testimony on direct examination, with the testimony of defendant's other expert, Carter, and with the testimony of plaintiff's expert, Aldrich, to the effect that an elevation of the breast-roll will cause an acceleration of the stock from the speed at which it enters upon the wire, the action of gravity being just the same whether the operator has in mind the carrying of the stock farther towards the suction boxes to secure better drainage, or a reduction of the relative velocity of stock and wire to secure a smoother sheet.

The difference in acceleration from the speed at which the stock enters upon the wire, due to the head in the flow box, produced by a three-inch pitch, or that produced by a five-inch pitch, or a twelve-inch pitch, is merely a difference in degree, and any desired speed can be obtained, at any point on the

wire, by the use of either a three-inch pitch, a five-inch pitch, or a twelve-inch pitch, or, in fact, any other pitch, by varying the amount of head, as illustrated by the table on page...of this brief which was admitted by plaintiff's counsel at the argument in the Court of Appeals to be correct. So that, as Livermore puts it:

"In all of the cases, including the defendant's, there are variable factors, namely, the speed of the wire, the initial head, and the pitch or slope of the wire, each of which may be varied in accordance with the judgment of the operator, and two of which, namely, the head and the slope, have a controlling influence on the actual velocity of the liquid; while the third, namely, the wire speed, has an effect upon the relative velocity of the liquid acquired from the action of gravity, and the velocity of wire speed acquired from the driving power of the machine" (Rec., p. 975).

PLAINTIFF'S COUNSEL ARGUE THAT USERS OF PRIOR ART MACHINES HAD IN MIND ONLY DRAINAGE EFFECT, AND DID NOT APPRECIATE THAT INCREASE IN PITCH LESSENED DIFFERENCE BETWEEN SPEED OF STOCK AND SPEED OF WIRE.

It is urged by plaintiff, that no one prior to Eibel realized that commotion in the stock, at the head of the making wire, was due to the fact that the wire was traveling much faster than the speed at which the stock entered from the flow box onto the wire, and that the realization of this fact was a "brilliant discovery" on the part of Eibel.

It seems unbelievable that any man of even moderate common sense could operate a paper making machine for a single day with a low head and a high speed wire, without discovering that commotion in the stock must necessarily occur from the fact that the wire was traveling much faster than the speed at which the stock flowed upon it, and that better results would be obtained by lessening the difference between the speed of the wire and the speed at which the stock entered upon the

wire which might be done either by increasing the head or the pitch of the wire.

A number of witnesses, however, testify that long prior to Eibel they did know that there was a relation between the desirable speed of the stock and the speed of the wire, and that the speed of the stock would be increased or accelerated by the use of a pitched or declining wire.

This fact was also known to paper makers in England prior to 1904, as appears from the decision in the English case in which it is said:

"It is quite obvious, however, that the relative velocity of stock and wire was present in the mind of Mr. Martin, the paper maker, who thus dealt with Messrs. Lloyd's machine" (Appendix, Defendant's Brief, p. 358, lines 5-7. Italics ours).

The witnesses in this record who testify as to a knowledge of a desirable relation between speed of stock and speed of wire are:

(1) Peter R. Thom, superintendent of the Kimberly-Clark Mills at Niagara, and Kimberly, Wisconsin, who blocked up the breast-roll end of the machine in the Niagara Mill, in January, 1902, by means of four-inch blocks placed under the legs, because, as he says:

"At the speed we was running, say 450 to 475 feet—we thought we would get a better formation by raising the Fourdrinier, so as to help the flow or velocity of the pulp, and consequently the formation would come better that way; we would be relieved of the drawing of the pulp as it entered upon the wire" (Rec., p. 333).

This machine was used for making newsprint and the blocking continued under the machines while Thom was at the mill from January to October, 1902, and up to the time he was going around the mills, about two years prior to the taking of his deposition in May, 1917. The suction boxes were also adjusted.

(2) Clarence E. Kinney, mechanical engineer of the Bagley

& Sewall Company who states that he had known for many years prior to Eibel that:

"If the wire ran faster or slower than the water you got a ripple, and that ripple affects the formation of the sheet" (Rec., p. 557).

This witness testified that there could be a difference in speed between the wire and the stock of from 50 to 100 feet per minute (p. 558), and that the desired velocity of the stock could be obtained by either the head, or the pitch of the wire; that it would make no difference in the action of the machine whether the desired velocity of the stock was obtained by the amount of head carried, or by the pitch of the wire. This position is substantiated by the action of the Champion Paper Company in changing from a pitch of fifteen inches to a flat wire and a head of ten inches, with an increase of speed of from 500 to 540 f. p. m., when suit was brought against it by the plaintiff herein for infringement of the Eibel patent, as we have pointed out, and by the action of plaintiff's licensee, the International Paper Co., in its recent abandonment of a pitched wire for a flat wire, and a high head, with no decrease in speed.

(3) Stuart D. Lansing of the Bagley & Sewall Company (Rec., p. 666). It is true that this witness thinks that a better effect is produced by increasing the head, so as to bring the stock onto the wire at the required velocity instead of having it acquired by "running down hill" (Rec., p. 646).

This position seems to be not unreasonable in view of the experience of the Champion Paper Company, and the International Paper Co., above referred to, in changing from pitched wires to flat wires and higher heads. It would seem to be further substantiated by the fact that defendant's No. 2 machine which has been operating now for five years with a six-inch pitch, has given less trouble, and made stronger paper, since the pitch was decreased from 13½ to six inches, and the

head increased to eight inches, with no lessening in the speed.

(4) Michael Argy (Rec., p. 434).

(5) John T. Cunningham (Rec., pp. 458-459).

(6) Wm. F. Hazel (Rec., pp. 498-499).

The last three witnesses worked in the Palmer's Falls mill where the machine was blocked up at its breast-roll end, as testified by these witnesses, and by Ross, and where, according to a memorandum made by Kinney, the machine was running at 512 f. p. m. on September 25th, 1899.

(7) C. R. Dickinson (Rec., pp. 727-736).

It is conceded by plaintiff's counsel, and was found by the District Court, that Dickinson blocked up his machine two inches in June, 1902. Dickinson testifies that he had in addition a one-inch pitch from the adjustment on the machine, giving him at that time (June, 1902) a three-inch pitch. His record shows that he used blocks as early as October, 1900, and was running at that time at a speed of 545 f. p. m. (Rec., pp. 728-729).

Dickinson makes it very clear that while he had only the drainage adjustment in mind when he used the pitch of an inch and-a-half, when he went to the 2-inch blocks, getting a 3-inch pitch, he had another purpose in mind, which was to get rid of the cross waves in the sheet.

It is said that Dickinson's testimony is discredited by the testimony of Hall (Rec., pp. 743-747), and our statements in reference to the time referred to by Hall are criticized in the appendix to plaintiff's brief.

Without entering into any discussion as to the testimony of these two witnesses. We state that if this testimony is examined, the court will be fully convinced that he used a pitch of one-and-a-half inches in 1900, starting his machines with a speed of 545 f. p. m.; that he increased the pitch in June, 1902, to three inches, using the 1-inch adjustment on the machine, and 2-inch blocks; that the purpose of this was to get rid of cross

waves which made heavy and light streaks in the paper, and that sometime later, the date not being positively fixed, but which Dickinson says was in 1904 or 1905, he increased this pitch to four inches, which has been used ever since.

Certainly Dickinson is a disinterested witness, because he has never used a pitch of over four inches, which is conceded not to embody the Eibel invention or come within the claims of the Eibel patent. Dickinson is therefore not interested in defeating Eibel's claims.

(8) George C. Bayless (Rec., pp. 701-718).

The testimony of this witness, hereinbefore referred to, makes it certain, unless the witness is committing deliberate perjury, that he knew in 1902, when he ordered his present machines, that it was desirable to have a machine capable of a considerable adjustment of the breast-roll end of the wire, so that he could both carry the stock farther down the wire towards the suction boxes, and could form a better sheet by lessening the difference in speed between the stock and the wire.

Here are eight witnesses, six of whom were practical paper makers, and two of whom were practical builders of paper machines, all of whom testify that at the dates given, which were all prior to the Eibel invention, they knew that there was a relation between the speed of the paper making stock and the speed of the wire, and that it was desirable that the difference in speed should not be too great. The six paper makers all testify that the pitch given to the wires of the machines they refer to was not only for carrying the stock farther down the wire towards the suction boxes, for better drainage with a free stock, but also to get a better formation of the sheet, and as Dickinson expressly put it, to get rid of cross waves, which made "heavy and light streaks in the paper."

It is submitted, therefore, that statements to the effect that no one prior to Eibel ever discovered that there was any relation between the speed of the stock and the speed of the wire, or

that an excessive difference between the speed of the stock and the speed of the wire was the cause of waves or streaks in the paper, are not only absurd upon its face, but are directly disproved by the testimony of the witnesses, to which we have referred.

If an English paper maker discovered this relation prior to 1904, as held by the English court, it would seem incredible that it should not be discovered by some American paper maker, and certainly by Dickinson who ran his machine at 545 f. p. m. as early as 1900.

XI.

THE ALLEGED PROCESS.

PATENT IN SUIT IS UPON A MACHINE AND NOT A PROCESS.

It has been urged in this case by plaintiff's counsel, that the claims of the patent in suit might properly be construed as process claims; that claims 1, 3 and 12 are "process claims," and that claims 2, 7 and 8 are "machine claims."

We know of no reported case in which a claim drawn as a "machine claim" has ever been construed and sustained as a process claim. In fact, the authorities with which we are familiar are all the other way.

The rule in reference to the statutory classes of invention has been stated as follows:

"An invention cannot be claimed for other than one of the statutory classes, and it must be claimed as being an invention of the particular class to which it belongs" (7 Fed. Stat. Ann. 2nd Ed., p. 162).

This rule has been consistently followed by the courts.

In the early case of *Corning v. Burden*, 15 How. 253, 14 L. Ed. 683, it appeared that the trial court in instructing the jury had construed the patent in suit to be for a process, saying:

"The Letters Patent to Henry Burden, which has been given

in evidence by the plaintiff, are for a new process, mode, or method of converting puddlers' balls into blooms by continuous pressure and rotation of the ball between converging surfaces."

Referring to this instruction the Supreme Court said:

"The specification declares that his improvement consists in 'the employment of puddlers' balls'; again he calls it 'my rolling machine,' and describes his 'machine as consisting of a cast iron cylinder,' etc. In fine, his specification sets forth the 'particulars' of his invention, in exact accordance with its title in the patent, and in clear, distinct, unequivocal and proper phraseology. * * *

His patent having a title which claims a machine, and his specification describing a machine, to construe his claim as for the function, effect, or result of his machine, would certainly endanger, if not destroy its validity. His claim cannot change or nullify his previous specification with safety to his patent. He cannot describe a machine which will perform a certain function, and then claim the function itself, and all other machines that may be invented to perform the same function.

We are of opinion, therefore, that the learned judge of the court below erred in the construction of the patent, and in his first proposition or instruction to the jury. And as the second and third instructions are based on the first, they must fall with it."

This is a clean-cut holding by the Supreme Court in this early case that a patent on a machine cannot be construed as a patent for a process.

The patent in suit is clearly drawn as a patent on a machine. It is so designated in its title, and every claim is drawn for "a Fourdrinier machine." The specification throughout describes the machine and nowhere suggests or indicates that the invention is in a process.

The patent being drawn for a machine must stand or fall as a machine patent, and in accordance with the rules laid down by the courts in respect to such patents. While a new process may be carried out by an old machine, or even by manipulation with the human hands, an old machine cannot be re-patented, with nothing more than formal changes, even

if it is intended to be used for a new purpose.

The distinction between carrying out a new process by an old mechanism, and using an old machine with only formal changes for a new purpose, is clear and well recognized.

Under the argument advanced by plaintiff the Eibel patent covers nothing more than using the machines of the prior art, such as Barrett & Horne, Bayless-Austin, Kimberly-Clark, or Bagley-Sewall, with merely formal changes with a new purpose in view.

The Eibel machine, as shown in the drawings of the patent, is a substantial replica of the machine of the Barrett & Horne patent No. 691,333, or the Bagley & Sewall machine shown in the blue print, Exhibit T (Rec., following p. 1084), as well as of other prior art structures, and under the decisions of the Supreme Court, the most recent of which is *Scaffolding Co. v. Chain Belt Co.*, 254 U. S. 32, 37, the patentees, or builders, of these prior machines, and the public at the expiration of any patents thereon, are entitled to all of the benefits that may be derived from the use of the device or that can be obtained by formal changes, whether used for the same purpose or for a different purpose.

In *Merrill v. Youmans*, 94 U. S. 570, 24 L. Ed. 235, the Supreme Court held that a patent on a process could not be construed as a patent upon the product of that process.

The court said:

"It seems to us that nothing can be more just and fair both to the patentee and to the public, than that the former should understand and correctly describe just what he has invented, and for what he claims a patent.

In consistency with these views, we are of opinion that the appellant in this case has described and claimed a patent for the process of deodorizing the heavy hydrocarbon oils, and that he has not claimed as his invention the product of that process."

In *Burr v. Duryea*, 68 U. S. 531, 17 L. Ed. 657, the Supreme Court said:

"The Patent Act grants a monopoly 'to anyone who may have discovered or invented any new and useful art, machine, manufacture, or composition of matter.'

That the invention of Wells comes within the category of a 'machine,' cannot be disputed. The law requires that the specification 'should set forth the principle and the several modes in which he has contemplated the application of that principle or character, by which it may be distinguished from other inventions, and shall particularly point out the part, improvement, or combination which he claims as his own invention or discovery.' We find here no authority to grant a patent for a 'principle' or a 'mode of operation,' or an idea, or any other abstraction. A machine is a concrete thing, consisting of parts, or of certain devices and combination of devices. The principle of a machine is properly defined to be 'its mode of operation,' or that particular combination of devices which distinguishes it from other machines. A machine is not a principle or an idea. The use of ill defined abstract phraseology is the frequent source of error. It requires no great ingenuity to mystify a subject by the use of abstract terms of indefinite or equivocal meaning. Because the law requires a patentee to explain the mode of operation of his peculiar machine, which distinguishes it from others, it does not authorize a patent for a 'mode of operation as exhibited in a machine.'"

In *Boston Elastic Fabrics Co. v. East Hampton Rubber Thread Co.*, 1st Holmes, 372, 3 Fed. Cas. No. 1676, which was tried before Circuit Judge Shepley and District Judge Blatchford in the Circuit Court for the District of Massachusetts, Judge Shepley said:

"The patent in this case is for a machine, not for a process. If it were possible to give to this patent a construction which would secure to the patentee the benefit of that invention which is suggested perhaps, though not distinctly stated or claimed in the patent itself, but is relied upon in the argument as the invention of Hull (namely, his process of cutting a rubber sheet into threads, whereby a series of parallel threads are cut from a single sheet by a single cut of a single knife), the court would feel disposed to do so; but the language of the patent itself is so clear, that it seems to us necessarily to exclude such a construction."

After stating that the patentee in this case cut thin sheets

of rubber, wound about a drum in a spiral curve, into a series of parallel strips, the court further said:

"This Hull discovered. He invented no new machine, but he operated an old machine in a different manner, and produced a new and different result. That he did not make a patentable invention we are not disposed to decide; but the discovery of a new mode of operating an old machine to produce a new result does not give to him the right to a monopoly of the old machine. Broadly as courts are disposed to construe patents for the sake of upholding a meritorious invention, yet when it is too clear to admit of a doubt that the patent is for a machine, the court cannot change it into a patent for an art."

In *American Tube Works v. Bridgewater Iron Co.*, 132 Fed. p. 16, before Holmes, Circuit Justice, Putnam, Circuit Judge, and Aldrich, District Judge, and in which the opinion is by Justice Holmes, it is said:

"The patent to Adams stated its claim thus: 'What I do claim (as a new article of manufacture) is a tube or cylinder cast out of copper and free from blow holes and other similar defects when produced as herein stated.' We assume that Adams had invented a new and valuable process, which it is unnecessary to describe, but by which he produced a much larger percentage of sound copper tubes than it had been possible to produce before. But he took his patent for the product, and he must stand upon his claim as it was made."

As said by Judge Warrington in the English case

"The patentee proposes no alteration in the machine itself; the machine remains identically what it was before. He does not produce a new machine; all he suggests is what he considers a novel and useful mode of employing the old machine to produce the same article" (Appendix Defendant's Brief, p. 356, of opinion).

We have quoted, on page 82 of this brief, the statement of the Court of Appeals that there is obvious difficulty in construing any of the claims of this patent as process claims.

In Judge Anderson's opinion, following the statement thus quoted, the foregoing paragraph from the opinion of Mr. Justice Holmes in *American Tube Works v. Bridgewater Iron Co.*,

is quoted, and the cases of *Boston Elastic Fabrics Co. v. East Hampton Rubber Thread Co.*, 3 Fed. Cas. 1676, and *Burr v. Duryee*, 1 Wall. 531, are cited. The opinion then proceeds as follows:

"The case of *Breuchaud v. Mutual Life Ins. Co.*, 166 Fed. 753, 756, cited by the plaintiff as authority for its proposition that, 'It is immaterial whether they (the claims) are phrased in terms of process or of machine' falls far short of being an authority for so broad and far-reaching a proposition.

Claims 1 and 2, in the Breuchaud patent held to be process claims, plainly describe a method or process for the construction of sub-bases for old walls. In claim 1 the word 'method' is used and the method described. In claim 2 the phrase 'while they are driving' was said by the court to indicate a process. Claims 3 and 4, which were for the product of the process, were held void.

We refer to the difficulty on this point in order to make it clear that we do not, by implication, adopt the plaintiff's rule of construction. We are not now prepared to hold that claims 1, 2, 3 and 12 of the Eibel patent do 'particularly point out and distinctly claim' (Rev. Stat. R. S., Sec. 4888) alleged new processes" (Rec., p. 198).

XII.

PRIOR DECISIONS UPON EIBEL PATENT.

THE REMINGTON-MARTIN DECISION IN THE N. Y. CIRCUIT COURT OF APPEALS DEPENDED UPON THE LIMITATION THAT THE GRAVITY SPEED OF THE STOCK WAS "APPROXIMATELY EQUAL TO THE SPEED OF THE WIRE."

It has already been shown that the language of the patent and claims admits of no other interpretation. We will now show that the above conclusion as to the New York decision is necessitated for the following reasons:

1. The language of the New York opinion.

2. This limitation is indispensable to the specification and claims of the patent for validity.

3. This limitation is indispensable to avoid invalidity as being for a mere difference of degree.

The New York decision (Rec., p. 1076) expressly adopts the language of the District Judge when it says, "He pointed out succinctly what Eibel had accomplished" as follows:

"So far as I have been able to discover, no one claims to have discovered the advantages of having the wire carrying the stock and the stock move together at substantially the same speed, *the stock impelled by gravity* and directed by the wire. * * * The rule is invoked that it is not invention to improve in degree merely on a principle of operation old in the art. This may be conceded, but I think Eibel discovered and particularly disclosed much more than this. He not only elevated the breast-roll end of the paper-making wire, but regulated the speed at which the wire should move, making it move at equal speed with the stock, so that there is no obstruction to the *natural flow of the stock under the influence of gravity.*"

The words in Italics in the above quotation clearly show that to avoid the defense of degree, both the District Judge and the Circuit Court of Appeals in the New York case relied upon the supposition that the "Natural flow of the stock under the influence of gravity" was the critical limitation whereby the principle of the Eibel patent was distinguished in more than degree from the prior art.

Furthermore, in avoiding the defense of indefiniteness of claims in the New York case the Circuit Court of Appeals' decision relied upon the same features saying,

"The pitch of the wire and the wire speed must be so correlated that *gravity will accelerate the stock to speed equality with the wire* * * * a claim using the phraseology of claims 1, 2 and 3 will not be held invalid" (Rec., p. 1084).

The phraseology of the claims here referred to is unquestionably this of claims 1 and 3—

"The stock is caused to travel by *gravity* * * * at a speed approximately equal to the speed of the wire"

and this of claim 2—

"The stock is caused to travel *by gravity* * * * the wire to travel at substantially the same rate of speed."

Thus we find in the opinion, to avoid the defenses of degree and of indefiniteness, dependence placed upon the very feature which is lacking in defendant's machine, namely the *equality* between the gravity speed of the stock and the wire speed, or in other words, "The natural flow of the stock under the influence of gravity," eliminating the drag of the wire.

The second reason above assigned why this limitation was considered essential by the New York Circuit Court of Appeals is because it is the only theory upon which the patent can be sustained against the defense of indefiniteness. If this limitation had been omitted from the specification, and claims 1, 2 and 3, the only expressions which would be left to point out the critical point at which the invention begins would be the words, "substantial elevation" of claims 1 and 3 and "high elevation" of claim 2. But it is well established by the decisions of the Supreme Court and the Circuit Court of Appeals that such words of degree as "small," "strong," etc., in the same category with "high" or "substantial," do not comply with the requirement of the statute.

In *Chemical Rubber Co. v. Raymond Co.* (C. C. A. 3rd Cir.), 71 Fed. 179, the prior art contained processes treating the fibrous rubber waste with dilute acid, but the patent in suit said that "all of these processes have been so far from practical that the waste is generally considered valueless," and in contradistinction thereto claimed the use of "strong sulphuric acid." The court held that the patent must be limited to sulphuric acid without any dilution whatsoever, otherwise it would be invalid; saying:

"We have only to add that if Mr. Mitchell's invention, as is now claimed, really involves the use of diluted acid, and dilution with water is requisite to the operation, it was his duty to describe the solution or state the practical rule which accomplishes the desired result. His own specifications set forth that unsuccessful attempts had been made to subject rubber waste to the action of heated solutions of diluted sulphuric acid for the purpose of recovering the rubber. This made it all

the more necessary that he should distinguish his particular solution from those already tried. Merely to describe the use of heated acid, without any information whatever as to the extent of the required dilution of the acid, was to add nothing to the stock of common knowledge. Mitchell's invention, it will be observed, rested upon an original discovery, and he was bound to disclose fully to the public, in and by his patents, his *modus operandi*. Upon this point the provisions of Section 4888 of the Revised Statutes are imperative."

In *Wood v. Underhill*, 5 How. 1, 5, the court said:

"But when the specification of a new composition of matter gives only the names of the substances which are to be mixed together, without stating any relative proportion, undoubtedly it would be the duty of the court to declare the patent to be void. And the same rule would prevail where it was apparent that the proportions were stated ambiguously and vaguely."

This case has been frequently cited as an authority in the various courts.

De Lamar v. De Lamar Min. Co., 117 Fed. 240, 248, C. C. A. 9th Cir.; *Neptune Meter Co. v. National Meter Co.*, 127 Fed. 563, 568, C. C. A. 3rd Cir.; *Fullerton v. Anderson*, 166 Fed. 443, 463, C. C. A. 9th Cir.; *Solva v. Perkins*, 251 Fed. 64, 69 C. C. A. 7th Cir.

The same principle which resulted in limiting the Mitchell patent to the exclusion of water as a factor, must result in this case in limiting the patent in suit to the exclusion of the drag of the wire as a factor in the speed of the stock. And the same principle which required that the strength of solution should be more definitely pointed out than by the word "strong" requires that the elevation in this case must be pointed out more definitely than by the words "high" or "substantial" and makes the sufficiency of the description devolve upon the elimination of the drag of the wire which defendants do not use.

Hence, we repeat that in view of the above the New York Circuit Court of Appeals could not have sustained the patent but for the limitation of it to the "Natural flow of the stock un-

der the influence of gravity," unmolested by the drag of the wire, which defendant does not have.

The third reason assigned above why this limitation was necessary to the decision of the New York Circuit Court of Appeals was because it is essential to avoid the defense of degree which the quotation from the District Court by the Circuit Court of Appeals admits "may be conceded" but for the supposed discovery of Eibel that the flow of the stock must be exclusively a gravity flow or the "Natural flow of the stock under the influence of gravity."

In the prior art, to the degree that the pitch was raised, the drag factor was lowered in attaining any given speed of stock and any given output. This was just as true then in the prior art as it is today, and is a law of physics which is followed just as truly by raising the pitch to three, four or five inches as by raising it to twelve inches. It may be that the benefit of raising the pitch to three, four or five inches is still further increased by raising it to twelve inches but a teaching of this kind is not patentable.

Court of Appeals in Remington-Martin Case Misled as to Prior Art Structures.

The references in Judge Mayer's opinion to the Fourdrinier machine art as it existed prior to the date of the alleged Eibel invention, clearly shows that he was not only misinformed as to the art as it actually existed, but that he was misled, and misunderstood a considerable portion of the testimony relating to the prior art that was before the court in that case.

An example of this misunderstanding is found in the reference by the court to the testimony of the witness, Warner. Judge Mayer quoted Warner's testimony as "referring to conditions at the Willamette mill," and from the context of the opinion it is clear that he understood that Warner was refer-

ring to conditions at this mill at the time immediately prior to the date of the alleged Eibel invention. Judge Mayer makes two quotations from Warner's testimony. We quote from the opinion:

"Warner, a machine tender and presumably an expert man, referring to conditions at the Willamette mill said:

> 'We were continuously trying to form a better sheet, to make an increase in the speed that they were calling for. They wanted more speed, and at the same time they wanted as good a grade of paper. We puzzled our brains over the business to find a way to meet the requirements. * * * Our mill wasn't paying very well, and we were wild to increase our product and trying all manner of schemes to increase the speed of the machines that we might make some profit off the mills.'

Nothing could be more convincing of the futility of the so-called use, than the failure by expert practical men to accomplish a desired result and the discarding of an old method and the adoption of a new one immediately upon its advent" (Rec., p. 1083; 234 Fed. 631).

It is certain that the court in writing this statement understood that Warner was referring to conditions existing at the Willamette Mill at the time of the alleged Eibel invention.

As a matter of fact, however, Warner, in the testimony here quoted, is referring to conditions as they existed shortly after 1879. This is clear from an examination of Warner's testimony as it appears in answer to Q16, p. 4 of Warner's deposition in the Remington-Martin suit. Asked specifically by Q18 to fix the date when he made the first experiment to which he referred, for the purpose of overcoming the conditions stated in the first portion of his testimony quoted by Judge Mayer, he answered: "Approximately 1884 or 1885."

The second portion of Warner's testimony referred to the same period, as clearly appears from the question and entire answer, from which the sentence quoted by the court is taken, which read as follows:

"XQ100. Just what was the difficulty that you met when

you tried to speed up the wire at the time when you were running the machine under the original conditions, before any change had been made?

A. It was a wild sheet, and the faster you ran the paper machine the more wild your sheet is; the slower you run your machine the finer the sheet it makes, as it has more time to form on the forming surface wire. *Our mill wasn't paying very well, and we were wild to increase our product, and trying all manner of schemes to increase the speed of the machines, that we might make some profit off the mills*, hence our anxiety to improve the sheet as we tried to run faster and still make a salable sheet of paper" (Remington-Martin Rec., p. 17).

This testimony, therefore, it will be seen clearly refers to conditions as they existed in the Willamette mill some twenty-three or twenty-four years (nearly a quarter of a century) prior to the date of the Eibel patent. These conditions had been materially changed long prior to the Eibel patent, and the Willamette mill had for many years been operating Bagley & Sewall machines that were running with a high head and a low pitch at more than 500 f. p. m. "The History of Paper Manufacturing in the United States" from which we have quoted, refers to this mill as having machines making paper before 1897, at 500 f. p. m.

Judge Mayer also referred to the evidence intended to show prior uses at Rhinelander, Palmer's Falls and Niagara Falls, and said that these did not merit discussion. We fully agree that the evidence presented did not merit discussion. There was certainly a very inadequate showing of the operation of the machines at Palmer's Falls.

The court refers to the operation of machines by the Remington-Martin Company at Norfolk, New York, and by the Raymondville Company at Raymondville. Its conclusion regarding these machines is based entirely upon the testimony of Edward M. Hall, who at the time he testified was superintendent of the St. Regis Paper Company, which appears in this record as one of the plaintiff's licensees (Rec., p. 36). Serious

doubt is cast upon the accuracy of Hall's testimony by the testimony of Lansing and Kinney in this case.

Moreover while Hall stated that when he went to the Remington-Martin mills in the spring of 1907, the machines were running with a level wire, he did not state that they were then making news print paper, and it clearly appears, both from the record in the Remington-Martin suit and the record in this case, that it is customary even at the present time to use a level wire when running heavy paper.

Judge Mayer quotes from the testimony of Hall respecting the raising of the pitch of the Raymondville machine from three inches to six inches, and the dropping of it back again to three inches. In reference to this change Judge Mayer says:

"The best proof of the failure of this effort is the fact that the production fell off."

We find nothing in the record of the Remington-Martin suit supporting this statement of the court. On the contrary the former superintendent Hall whose testimony is quoted in the opinion, specifically stated the contrary. Hall testified that when he went into the Raymondville mill the machines were operating with a three-inch pitch and were running at a speed around 500 feet; that he added three inches more, making a six-inch pitch; that a machine tender thought it was not beneficial in some ways so it was put back to three inches; that the rate of travel was substantially the same during all this time, and that the amount of paper produced after the machine was lowered was about the same as when it was operated at the six-inch pitch (Remington-Martin Record, pp. 212-214).

If there is any evidence in the Remington-Martin record supporting the statement made by the court that the production of the Raymondville machine fell off, either when the wire was raised from three inches to six inches or when it was again lowered from six inches to three inches, we have failed to discover it.

It seems to us clear that there was not only a very inadequate record as to the prior art in the Remington-Martin suit, but that there must have been on the part of the defendant in that case a very inadequate presentation of the facts disclosed by the record to the Circuit Court of Appeals.

COURT OF APPEALS IN REMINGTON-MARTIN SUIT MISLED AS TO SPEED OF PRIOR ART MACHINES AND AS TO EFFECT OF APPLYING HIGH PITCHES TO SUCH MACHINES.

In the Remington-Martin suit Little testified:

"Practically every paper mill was prior to and at the time of Eibel's invention using its utmost endeavors to increase its production and yet make commercial paper and all found that commercial paper could not be made with the machines as then made at a speed greater than 450 feet per minute, for the reason that with a greater initial relative velocity between stock and wire than was represented by this speed the sheet would not smooth out in time to make a good paper" (Remington-Martin Record, p. 35).

This statement has been copied by Aldrich in his deposition in this case (Rec., p. 24). Asked upon cross examination when on the stand in rebuttal whether he based such statement upon his own knowledge of the art or whether he copied it from Little's deposition, Aldrich replied:

"I based it upon my own knowledge of the art" (Rec., p. 155).

However, when first on the stand Aldrich had testified as follows:

"XQ192. Then you have no personal knowledge as to the speed at which machines constructed after about 1898 or 1899 were being operated prior to the date of the Eibel invention? A. I have no personal knowledge of the speed of the machines previous to 1905" (Rec., p. 62).

In his testimony in this case, Aldrich said:

"Accordingly, if the paper-making wire under these conditions is run at a speed not exceeding 200 feet, the wire has no

work to do in the way of causing the stock to attain the speed of the wire, since the stock starts at that speed. If, however, the wire runs at 400 feet a minute, as was occasionally done on news machines, that is, machines making news paper at the time of Eibel's invention, then the making wire would be moving at a speed twice that of the stock, coming onto the wire under a head of two and a quarter inches, etc." (Rec., p. 16).

A similar statement was made by Little in the Remington-Martin suit (Remington-Martin Record, p. 27).

We think these statements were intended to cause the court to understand that an initial speed of 200 feet per minute *could not be exceeded*, and that, therefore, a newsprint machine could not be run at a greater speed than 450 f. p. m., prior to Eibel's alleged invention, *because if it were there would be a greater initial relative velocity between stock and wire and hence the sheet would not smooth out in time to make good paper.*

As a matter of fact, however, as shown by this record, machines were run, prior to Eibel, at a very much greater speed than 450 f. p. m. and made commercial newsprint paper, and with pitches varying from one and one-half to four or five inches. They did, however, use a greater head than the two inches which Little and Aldrich assume apparently to be the limit that could be employed. By using a greater head the initial relative velocity between stock and wire, even when the wire was running much faster than 450 f. p. m., was much less than the initial relative velocity assumed by Little and Aldrich as necessary when a speed of 450 feet was attained.

In other words Little and Aldrich assert that 450 feet was the maximum at which a newsprint machine could be run, before the alleged Eibel invention, and make good paper. They say the reason for this is that with the wire speed of 450 f. p. m. the stock will come onto the wire at an initial velocity of 200 f. p. m. This will leave a difference of 250 f. p. m. that must be added to the speed of the stock before speed equality between

the stock and wire is attained; and these witnesses intimate, if they do not say directly, that if the machine were speeded up above 450 f. p. m. this difference between the speed of the stock and the speed of the wire would be so increased that good paper could not be made.

As a matter of fact, however, they either did not know, or they have failed to point out, that by increasing the *head*, without increasing the pitch, the initial velocity at which the stock could be flowed onto the wire could be very much increased, and, therefore, the speed of the wire could also be increased, in which case the difference between stock speed and wire speed would be very much less than the 250 f. p. m. suggested by them as the limit that could be permitted with the making of good paper.

To illustrate: The Bagley & Sewall machines in 1904 were run at a wire speed of practically 530 f. p. m. By using a head of eight inches the initial speed of the stock as it entered upon the wire was substantially 380 f. p. m. This left the relative velocity, or difference between stock speed and wire speed, only 150 f. p. m.

Likewise in the Lisbon Falls machines, as they were being operated when examined by Carter, the paper speed was 530 f. p. m. and the wire speed 490 f. p. m. By using a six-inch head the stock was flowed onto the wire at an initial velocity of 325 f. p. m. leaving the relative velocity, or difference between initial stock speed and wire speed, 165 f. p. m.

It is thus apparent that by increasing the head it was always possible to increase the speed of the machine without increasing the relative velocity, or difference in speed between stock and wire.

It is, therefore, apparent that the reason given by Little, and repeated by Aldrich, why prior to Eibel's alleged invention "commercial paper could not be made with the machines as then used at a speed greater than 450 feet per minute," is not

sound, and that no such reason did exist or could exist. Commercial paper could be, and was, made, upon machines prior to Eibel's invention without as great a relative velocity between stock and wire as the 250 f. p. m. assumed as the limit by Little. This was done by increasing the head, and thereby increasing the initial velocity of the stock, as the speed of the wire was increased. As we have seen, not only was the head increased, but a pitch, in some instances as great as four or five inches, was also employed which further reduced the relative velocity between stock and wire. Even if the purpose the operators had in view was to get a better drainage, a reduction of the relative velocity between stock and wire necessarily followed and a consequent lessening of the agitation of the stock from the drag of the wire.

Judge Ray's Decision in the Remington-Martin Suit.

After considering the evidence in the Remington-Martin suit showing the prior use of pitched wires of from three to six inches, Judge Ray said:

"In short, I find from the testimony, which is not impeached, or discredited, or really contradicted, that everything this defendant is doing, was done, and well known and understood with many paper makers, before Eibel's alleged date of invention" (226 Fed. 772).

One of the most important of these prior uses was that at the Willamette mill. This was rejected by the Court of Appeals because of the testimony of Warner, a machine tender, and presumably expert man, which was quoted by Judge Mayer, as we have pointed out.

It is beyond question that Judge Mayer understood Warner was referring to conditions existing at the Willamette mill at the time the Eibel patent was issued. As a matter of fact, as we have already stated, Warner, in this testimony, was referring to conditions at the Willamette mill twenty-five years be-

fore, and he was explaining the operation of the machine "before any change had been made."

We believe that if it had not been for this mistake on the part of Judge Mayer the Circuit Court of Appeals would have agreed with Judge Ray that everything the defendant in that case was doing had previously been done, and was well known and understood with many paper makers before Eibel's alleged date of invention.

If this court examines the record in the Remington-Martin suit, we think it will be convinced that Judge Ray was right in his decision, and that the reversal of his decision was due to mistakes on the part of the Court of Appeals, in its understanding of the testimony relating to prior uses, particularly the testimony relating to the operation of machines with pitched wires at the Willamette mill.

No Question of Infringement in Remington-Martin Case.

It was said during the arguments in the lower courts that defendant's machines are substantially the same as the machines of the defendant in the Remington-Martin case, and that to hold in this case that defendant's machines do not infringe would be to reverse the decision of the Court of Appeals for the Second Circuit. This argument is specious, but manifestly unsound, because no question of infringement was raised in the Remington-Martin suit. There was no suggestion in that case that in the defendant's machines the stock was not accelerated by gravity, due to the pitch of the wire, after it entered upon the wire, to speed equality with the wire. There was no analysis, or showing, of the speeds produced by the head and pitch of the defendant's machines in that case.

It is, therefore, apparent that the question of infringement presented in this case, was neither presented to nor considered by the Court of Appeals for the Second Circuit.

Of course, it is true, in a sense, that the machines in the Remington-Martin case were the same as the defendant's machines in this case, because both the defendant's machines in that case and plaintiff's machines in this case, barring the question of the so-called "substantial" pitch, or inclination of the wire, were all old long prior to the date of Eibel's alleged invention.

As said by the English court, Eibel "proposes no alteration in the machine itself; the machine remains identically what it was before. He does not produce a new machine."

DECISION OF BRITISH HIGH COURT OF JUSTICE UPON EIBEL PATENT.

As we have stated the Eibel British patent, corresponding in all material particulars with the Eibel U. S. patent in suit herein, was held invalid by the British High Court of Justice, Chancery Division, in the case of *European Eibel Company, Ld. v. Edward Lloyd, Ld.* We bind in as an appendix to this brief a printed copy of the opinion of the court in the English court. We desire to call attention to a few of the statements of Mr. Justice Warrington, in delivering the opinion of the court. The following quotations from the opinion are of interest:

"Rapidity of manufacture, consistently with a satisfactory quality of paper, is of the greatest possible importance, and the plaintiffs claim that the patented invention attains both these objects, and it is said that, until this invention, such rapidity of manufacture as is now attained, with good quality of paper, was not and could not have been attained before."

The court found that the defendants in the case before it, prior to the date of the Eibel invention attempted to run their machine at a speed of 450 f. p. m., but did not get satisfactory results. They then put it back to 300 f. p. m. and obtained a better paper. The machine was then put back to the 450 feet and the paper it then made was not the satisfactory paper it

had made at 300 feet but the unsatisfactory paper that it had before been making at 450 feet. The defendant then raised the inclination of the sieve to a slight extent and found that this improved the paper on the two machines. Defendant thought he would go a little farther and, to quote from the opinion of the court:

"Accordingly he blocked up No. 9 until the inclination of the sieve was 4 9/16 in. of the breast-roll above the guide-roll; that is to say it ran down from 4 9/16 inches to nothing, and he found that with that inclination he could make at 450 f. p. m. as good a paper as he could make at 300 f. p. m. on the horizontal. In my opinion that is exactly equivalent to increasing his speed from 300 to 450, and proportionately increasing the elevation of his sieve; because the criterion is, the quality of paper which you can make. That showed him that he could at 450 feet make, with an elevation of 4 9/16, paper satisfying the condition to which I have referred, which he could only make on the horizontal with a speed of 300 f. p. m. That is what was done at Messrs. Lloyd's works. I am not forgetting that he made in reference to the three other machines, Nos. 5, 6 and 7, somewhat similar experiments, though the idea with regard to those machines was slightly different, namely, that of increasing the head and so getting an increased velocity in the stock. It is quite obvious, however, that the relative velocity of the stock and the sieve was present to the mind of Mr. Martin, the paper maker, who thus dealt with Messrs. Lloyd's machines. Before I leave this I want to mention one other thing, namely, that what he did with his machines was clearly not that slight adjustment which it will be found presently is referred to by the patentee, because the machines themselves were not constructed to admit of the adjustment which he made; he was compelled to raise the entire frame of the machine by blocking it up. The effect of that was that the inclination was a steady decline from the breast-roll over the suction boxes down to the guide-roll, not to the couch-roll, because there is a slight variation of incline between the guide-roll and the couch-roll, with which I need not deal (pp. 357-358).

In that state of things the present patentee comes and in general terms what he says is: 'I have discovered a mode by which you can make as good or better paper with a very much increased speed of production than you made at the lower speed, and I do it by so inclining the sieve or wire that I bring into force the action of gravity" (p. 358).

It will be seen here that what Justice Warrington says Lloyd's paper maker, Martin, did with the Lloyd machines is exactly what Dickinson did with the machines at Lisbon Falls in 1902, and what was done with the machines at Palmer's Falls in 1898. In both instances the machines were speeded up and did not make as good paper at the higher speed as they had been doing at the lower speed. Then the machines were blocked up and the wire was given a pitch, and it was found that then they made as good paper at the higher speed as they had done, before the blocking up, at the lower speed.

Dickinson says in reference to the Lisbon Falls machines that he got rid of the waves in the paper by blocking up the machine (Rec., p. 1130).

In reference to the Palmer's Falls machines, Argy says:

"After starting the machines we speeded them up to—No. 8 we speeded her up to 506 feet a minute, we found that we could not form our sheet or make a good product, we elevated the breast-roll then about 2½ inches by blocking up under the stanchions (p. 433).

"* * * but my recollection is that there were four or five inch blocks on the breast-roll end but pitched down to the suction boxes so that they were no more than shims (Rec., p. 433).

"We had already put her up to 506, tried it at 506 and at that we got unsatisfactory results—we found we had to do something, and by raising the Fourdrinier we were able to maintain it at 506 and make a satisfactory sheet' (Rec., p. 434).

Referring again to the opinion of Mr. Justice Warrington, after finding that there is not a sufficient definition of any invention in the specification, the court says:

"If there were, then I think the conclusion would be inevitable that what Mr. Martin did in 1904 would be an infringement of it. Mr. Martin in 1904 did, in my judgment, on the facts, get at a speed higher than that at which he could possibly have run the machine in order to get a good quality of paper, a quality of paper such as he would have got at the lower speed. As I have already said, I think that is equivalent to his having run the stock at a greater speed, and speeded up his machine

proportionately to the greater speed of the stock. If what Mr. Martin did in 1904 is within the specification, and I think it plainly is within the specification, and would, if it had taken place after 1904, be an infringement of the patent, then even if the specification does describe an invention, I think there has been prior user" (p. 361).

The present plaintiff is in exactly the same position, before this court, that the English plaintiff was in before the English court. If the defendant's construction is an infringement of the Eibel patent in suit, it is clear that these earlier constructions, such as that at Lisbon Falls, must also be an infringement. The interpretation of the limits of the Eibel patent in suit given by Aldrich, in the portion of his testimony on cross examination that we have hereinbefore quoted, clearly brings all such prior machines as the Lisbon Falls structure within the scope of the Eibel patent and hence invalidate that patent if it is to be construed along the lines testified to by Aldrich.

If it is to be held that the Lisbon Falls, and other prior machines, do not come within the scope of the Eibel patent, their exclusion must exclude the defendant's machines also. We think the reasoning of Mr. Justice Warrington applies exactly to the case before this court.

XIII.

ABANDONMENT OF HIGH PITCH BY PLAINTIFF'S LICENSEE.

Plaintiff's Licensee Has Abandoned High Pitch For Flat Wire With High Head.

It appears from the evidence that the International Paper Company, one of plaintiff's licensees, and a stockholder in the plaintiff company, about three years ago abandoned the high pitch that it had previously used on two of its machines in the Berlin mill, withdrawing these two machines from its license,

and adopted a flat wire with a high head, substantially after the plan of the machine in the Champion Paper Company mill to which we have above referred.

The evidence respecting this change is found in the affidavit of James M. Murray, mill manager of the International Paper Company. The body of Murray's affidavit reads as follows:

"James M. Murray, being duly sworn deposes and says that he is the mill manager of the International Paper Company, and is personally familiar with the Glen Mill of that company, located at Berlin, New Hampshire, and with the Fourdrinier Paper Machines located therein; that machine No. 5 is a Rice, Barton & Fales machine having a wire width of one hundred and three inches, and the No. 2 machine is a Pusey & Jones machine having a wire width of one hundred and twenty-two inches; that for a number of years prior to about the middle of 1918, these machines were operated with the paper making Fourdrinier wire having a pitch of 6 to 11 inches and a wire speed of 350 to 465 feet per minute; that said machines were operated under license from the Eibel Process Company; that on or about July 25, 1918, the wire on the No. 5 machine was changed to a flat or horizontal position and said machine has since been continuously operated with said flat wire; that no change has been made in the speed of the machine since the flat wire was adopted; that on July 31st, 1918, the International Paper Company notified the Eibel Process Company that it withdrew this machine from the license under the Eibel patent; that the No. 2 machine was changed to a flat wire on or about Sept. 1st, 1918, and has since been operated continuously with the flat wire and at the same speed as before; that this machine was withdrawn, from the Eibel license by letter dated September 5th, 1918" (Rec., p. 1000).

An affidavit made by A. W. Bronk who saw and examined these machines in the year 1918, has also been filed and is printed in the record (Rec., p. 1002). Bronk corroborates Murray as to the arrangement of the horizontal wire. Bronk has made a sketch illustrating the arrangement of the horizontal wire, and showing also provision for a head of eight inches or more for flowing the stock onto the wire. Bronk states that both machines were making news-print paper and that in his judgment the quality of the paper was fully equal to that of

paper being made on other machines in the same mill having the making wires arranged with the higher pitch. The sketch made by the witness Bronk is attached to his affidavit, and is reproduced (Rec., following p. 1092, Sheet 171).

It has been stipulated between counsel that these affidavits may be received and used in evidence "with the same force and effect as if the affiants named in said affidavits had each been called and duly sworn and had testified as set forth in his said affidavit."

This evidence further substantiates and corroborates the opinion of Lansing that there is no advantage in a high pitched wire, but that substantially the same result in accelerating the speed of stock, may be obtained with a low pitch, or no pitch at all, and a sufficiently high head.

XIV.

PLAINTIFF'S CLAIM OF IMPROVED RESULTS AND COMMERCIAL SUCCESS.

The Adoption of So-Called High Pitches.

Plaintiff's argument for patentability of the so-called high pitch of the making wire in the Fourdrinier machine, is based entirely upon its claim that by the adoption of this idea manufacturers were enabled to increase the speed and production of their machines. There is no sound basis for this claim.

Evidence Respecting Increase of Speed.

There is no reliable evidence in this case, nor do we find any in the record of the Remington-Martin case, showing that any increase in the speed of any paper machine has been due to the adoption of a so-called "high pitch." It is true that in 1904 and 1905, the maximum speed for paper machines was in

the neighborhood of 550 to 575 f. p. m., and that the normal speed of ordinary machines prior to about 1898, was from 475 to 480 f. p. m. It must be remembered, however, that a paper machine is very expensive, costing ordinarily more than one hundred thousand dollars, and is consequently used for a long time.

The Lisbon Falls machines, for instance, were installed, one of them prior to 1891, and the other in 1894. They were rebuilt in 1900, and were still in operation when Dickinson testified in November, 1917.

The machines that were being built between 1898 and 1905, apparently all ran at speeds of from 530 to 580 f. p. m. Defendant's machines, which were installed in 1911, have a wire speed of 585 f. p. m., and a paper speed of about 620 f. p. m. These may be taken, we think, to be machines of maximum speed at the time of their installation. It is probable that machines built since 1910, or thereabouts, have ordinarily been built for approximately the same speed as defendant's machines, but there is no evidence in this record, that a machine, designed to be run at a certain maximum speed, has been able to exceed that speed merely by giving its making wire a high pitch. This is made clear by the testimony of Lansing (Rec., p. 663).

In this connection attention may properly be called to the affidavit of Murray respecting the two machines in the Glen Mill of the International Paper Company at Berlin, N. H., which have recently been changed from a high pitch to a flat or horizontal wire. It appears that these machines, operating under an Eibel license, for a number of years prior to about the middle of 1918, ran at a maximum speed of 465 f. p. m. When they were dropped to a flat wire they continued at the same speed.

If, as plaintiff has sought to have the court understand, a machine running at a speed of 450 f. p. m. could, by merely giving a substantial pitch to its making wire, be speeded up from 450 f. p. m. to over 600 f. p. m., these machines could have been

operated at the higher speed ever since they have been running with a pitched wire. As a matter of fact, as appears from Murray's affidavit, their maximum speed, when operating with a pitched wire was 465 f. p. m., and they are now running at the same speed with a flat wire.

It is true that plaintiff produced one witness, Peter Talbot, who testified that at the plant of the St. Croix Paper Company (one of the owners of the plaintiff company), certain machines manufactured by Pusey & Jones, which ran at 420 feet when they were first put in, were afterwards speeded up to 535 feet with the wire pitched 1½ inches. Later, this witness says, the wires were pitched 12 inches and the machines were speeded up to 600 feet and are now running at 650 feet (Rec., pp. 113-114).

Talbot admitted, however, on cross examination, that many other improvements have been made in the operation of this mill since these machines were first put in, including changes in the pulp, "getting it more suitable to making paper," and that they kept making these improvements right along; that changes were made in the pulleys on the main line so that the machine can now be run faster than it could in 1906; changes were also made in the flow of the stock (Rec., p. 117).

All of this testimony is entirely consistent with the testimony of Lansing; with the testimony of H. C. Kinney respecting the present speed of the Remington-Martin machines at Norfolk and Raymondville; and with the affidavit of Murray which shows that when the International Paper Company was operating under the Eibel license its machines in the Glen mill were running at from 350 to 465 f. p. m., and that they are now running at the same speed with a flat wire.

Lansing's statement that no machine that has been raised to a high pitch has ever made greater speed than the same machine was producing before it was raised, stands absolutely uncontradicted in this record.

The testimony of Lansing was a direct challenge to plaintiff to make good its claim that the speed of paper machines was increased from 450 to over 600 f. p. m. by the adoption of the alleged Eibel invention. It called one witness who stated that certain machines in one mill originally started at a speed of 420 f. p. m. and afterwards speeded up to 535 f. p. m. with the wire pitched at 1½ inches, were later given a pitch of 12 inches and brought up to a speed of 650 f. p. m.

Clearly, however, the increase in speed may just as well have been attributed to other changes in the mill, which the witness admitted were made, having nothing whatever to do with the pitch of the wire of the Fourdrinier.

Defendant has shown, by testimony that is not questioned or disputed, that in 1917, one of the Remington-Martin machines at Norfolk, N. Y. (one of the machines referred to by Judge Mayer) making newsprint paper, was being operated with a pitch of 18 inches, and at a speed of 515 f. p. m. This is a Bagley & Sewall machine and is one of those referred to by Lansing in his testimony. It was not running any faster in 1917, with the 18-inch pitch than it was in 1904, at the time referred to in Lansing's testimony, with a 3-inch pitch.

The same witness in November, 1917, examined the two Remington-Martin machines at Raymondville. These machines were also referred to by Judge Mayer. In 1917, the 120 inch machine was pitched 12½ inches and was making newsprint paper at 540 f. p. m. The 114 inch machine was making thin catalogue paper, with the wire pitched at 14 inches, at 427 f. p. m. (Rec., p. 638).

These are the same machines about which Lansing testified, and his testimony proves conclusively that in 1904, with the three-inch pitch, these machines were running just as fast, or a little faster, than they were running in 1917, with pitches of from 12½ to 20 inches.

There is evidence in the record, independently of the recollec-

tion of witnesses, showing beyond question the speed at which the Bagley & Sewall machines were being operated prior to the date of the alleged Eibel invention. We call attention to this as follows:

(1) Letters Received by Bagley & Sewall Co.

Three original letters, from users of machines, dated respectively October 1st, 1904; October 11, 1904, and January 28, 1905, were produced by Mr. Kinney and Mr. Lansing. These letters are in evidence as "Defendant's Exhibits T-3, T-4 and T-5." We print the first and second letters, and quote from the other:

"Remington-Martin Co.
Paper Manufacturers,
Norfolk, N. Y.

Oct. 1, 1904.

Mr. S. T. Lansing,
Watertown, N. Y.
Dear Sir:

I am sending you under separate cover some samples made on the 100" machine, at a speed of 585 ft. per minute. Trust these will be satisfactory. I did not care to slow the machine down to 540 ft. in order to get the samples out at that speed.

Yours truly,
A. J. Lewthwaite."
(Rec., p. 1086).

"Laurentide Paper Company, Ltd.
Grand Mere, P. I., October 11, 1904.

Mr. Stewart D. Lansing,
Watertown, N. Y.
Dear Sir:

I want to thank you for your letter of October 3rd enclosing samples of paper made at Remington & Martin Co.'s at a speed of 585 ft. per minute. I am naturally very much interested in this subject, as we are doing quite a little in the speed line ourselves, at present, and in a short time think we will be able to give you some figures and also samples that will be interesting to you, from both a point of high speed and high quality. I think you have every reason to be proud of your machines, because they are certainly built with an idea of maintaining high

speeds and getting out good productions. I only wish that we had stuck to the three presses and put on about 32 or 34 dryers. We then could have reached the 600 ft. mark. Even at our speed of 553 ft., we are finding no difficulties in turning out 25 tons a day on your machine.

Yours very truly,
George Chahoon, Jr.,
Vice, President."
(Rec., p. 1086).

"Laurentide Paper Company, Ltd.
Grand Mere, P. I., January 28, 1905.

Bagley & Sewall Co.,
Watertown, N. Y.

Gentlemen:

In reply to your letter asking for the results we have been able to get from your last machine, we are glad to say that they have been most satisfactory.

The machine was started in August and therefore we do not think it has yet reached its maximum production, although the daily averages for the past few months have been beyond our original expectations. This machine was started at 503 ft. per minute and after running at this speed for two weeks, was put up to 553 ft. which speed has been maintained ever since. Believe the machine is capable of making good paper at faster speed than this, but as our motor is about up to its capacity, it is impossible for us to run faster.

I want particularly to tell you of our appreciation of the drive on this machine, to which we think the large production and high speeds are mainly due. We think this is about the smoothest running and best designed drive we have ever seen.

* * * * * * * * * * * *

Yours very truly,
The Laurentide Paper Co., Ltd.,
George Chahoon, Jr.,
Vice-President."
(Rec., p. 1087).

(2) *Bagley & Sewall Advertisement.*

In the issue of Wood Pulp News for February 10th, 1906, the Bagley & Sewall Company had a full page advertisement in which they inserted a picture of one of their Fourdrinier machines, in connection with which was the printed statement

"Has Made Newspaper at 618 feet per Minute."

A photostat copy of this advertisement is in evidence as "Defendant's Exhibit T-7" (Rec., following p. 1086).

(3) The Lansing Letter to "The Paper Mill."

In a letter written by Mr. Lansing to the trade paper known as "The Paper Mill," and published in its February 10th, 1906, issue, there is "A Discussion of Wide High Speed Fourdriniers." The letter, which is too long to quote in full in this brief, is in evidence, as a photostat reproduction (Rec., following p. 1086), as "Defendant's Exhibit T-6." We quote from this letter the following paragraph:

"We thoroughly believe in the high speed of machines for the manufacture of newspaper. We have run our machines through a period of years constantly at a speed upwards of 550 feet a minute, and have had some machines which have made paper satisfactorily at 580 feet a minute, and the fastest at 618 feet a minute. We have built these machines with the idea of keeping the strength to a point that will permit of the speed and reduce the wear and tear to a minimum, and the one limit which we have been brought against is the quality of the stock used by the paper makers."

(4) The Bagley & Sewall Catalogue.

Mr. Kinney produced a copy of the Bagley & Sewall catalogue for 1905, which was offered in evidence as "Defendant's Exhibit T-2" (Rec., p. 560).

In reference to this catalogue Mr. Lansing testified:

"That catalogue is an old friend of mine. That I personally wrote and made from the first page to its last, and issued during the middle of the year 1905" (Rec., Vol. II, p. 430).

This catalogue contains cuts of the Bagley & Sewall machines, including the Fourdriniers, statements as to the speed of the machines, and reproduction of several of the letters from which we have above quoted.

(5) *Entries in Lansing's Diary.*

Mr. Lansing when on the stand as a witness in this case produced his diary and refreshed his recollection by entries therein respecting the speed of the Bagley & Sewall machines in several mills counted personally by him. Some of these entries were read into the record.

Under date of October 25th, 1904, Mr. Lansing had made this entry in his diary:

"At Remington-Martin. 100 inch machine at 566. Raymondville 530. Then to Massena and Montreal. Met Bush, McGill and Carrier. Talked grinders and wet machines" (Rec., p. 650).

Referring to the Bagley & Sewall 100 inch machine at the Laurentide Paper Co., at Grand Mere, Quebec, a picture of which appears opposite page 29 of the catalogue, Mr. Lansing testified that on Wednesday the 26th day of October he counted the machine, making 552 feet of paper, the count being taken at the dryer, and he made an entry of that fact in his diary, which he read onto the record as follows:

"Went Laurentide. McGill, Ray (meaning Ray Ball) Bush and Carrier, Machine at 552. Got Pusey & J. stopped in all ways. At club that night with Sabatin, Woodcock, Acer and Main" (Rec., p. 650).

Mr. Lansing testified that on Friday the 28th of October, 1904, he had counted the speed of the four 160-inch machines furnished by his company for the Berlin Mills. These machines were installed in 1904, and on October 28th, they were making paper at the speed, taken at the dryers of 475 f. p. m. which would equal approximately 482 f. p. m. at the lower calendar roll. In reference to his counting of these machines Mr. Lansing read the following entry from his diary:

"Berlin. Mr. Brown sent for us to come to his house. Morning, at mill, grand sight. 475 feet. Gave Ray (meaning Ray Ball) price $35,000.00. $2,000 less for 3rd breast-roll. Burgiss then with Corbin at mill and in evening" (Rec., p. 655).

This record evidence shows conclusively that prior to the date of the alleged Eibel invention many of the Bagley & Sewall machines were running persistently and consistently at speeds of 500 to 550 feet per minute, and these records clearly show that the same machines, as Mr. Lansing has testified, were not increased in speed when they were blocked up so as to have a greater pitch to their making wires. It is undoubtedly true that other machines, capable of being run at a higher speed, were built, as Mr. Lansing has pointed out, subsequent to 1905 and 1906, and these machines were undoubtedly in many instances blocked up so as to run with a pitched wire, but their greater speed was not due to the pitch of the wire but to the other facts pointed out in Mr. Lansing's testimony.

XV.

ANTICIPATION OF CLAIMS 7 and 8.

THESE CLAIMS EXACTLY MET BY NORTHERN PAPER MILL MACHINE.

Claims 7 and 8 read as follows:

"7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction boxes supported at a corresponding declination, substantially as described.

8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction boxes arranged at different elevations, substantially as described."

It will be noted that neither claim makes any reference to the amount of pitch required in the making wire. Each claim merely specifies that the paper-making wire is "declined from the breast-roll to the guide-roll." It makes absolutely no difference, so far as these claims are concerned, whether the decline is obtained by a three-inch elevation of the breast-roll, or a

twelve, or a twenty-inch elevation. It is obvious that this claim would be infringed by a later Fourdrinier machine having a one, two or three-inch pitch of the wire, providing the suction boxes are supported at the same pitch or inclination. It is equally obvious that they are anticipated by an earlier machine having a three-inch pitch and the specified arrangement of the suction boxes.

Defendant has offered testimony respecting the construction of the machine of the Northern Paper mill installed in 1904. A drawing of this machine is in evidence as "Defendant's Exhibit R-5." This drawing is reproduced in the record (Rec., following p. 1084, Sheet 135).

Ross has testified that the side rails of this machine are continuous and have the suction boxes secured thereto, so that the suction boxes always have the same inclination as the making wire. Carter, defendant's expert, has pointed out that this Northern Paper machine 1904 construction responds precisely to claims 7 and 8 of the Eibel patent in suit. We quote from Carter's testimony as follows:

"The machine of the Northern Paper Company described in your question would respond precisely to claims 7 and 8 of the Eibel patent in suit. Claim 7, for example, calls for 'Fourdrinier machine having the paper-making wire declined from breast-roll to guide-roll and the suction boxes supported at a corresponding declination.' This exactly describes the Northern Paper Company machine. Claim 8 calls for a 'Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction boxes arranged at different elevations.' This also perfectly describes the Northern Paper Company machine. When the breast-roll is adjusted above the level by the adjustment provided in this machine, the paper-making wire will pitch downwardly from the breast-roll to the guide-roll and the suction boxes will be supported at the corresponding pitch and at different elevations, as one is behind the other" (Rec., p. 915).

This testimony is not disputed or contradicted in any particular.

The District Court made no specific finding respecting the question of anticipation of these two claims. It did not refer to the machine of the Northern Paper Company. It held that these claims were infringed by defendant's machines as they required, by the terms "substantially as described," that the wire be given a "substantial" declination. Aldrich, as we have seen, has testified that a substantial declination under the Eibel patent means a declination of five inches or more.

It is claimed that the machine in the Northern Paper mill which is shown in the drawing "Defendant's Exhibit R-5," is capable of only a three-inch elevation of the breast-roll. As these, however, are machine claims, and as every element of each claim is found in the anticipating machine arranged in the same manner and operating exactly in the same way, it can make no difference whatever, on the question of anticipation, whether the paper-making wire has a three-inch or a five-inch, or a greater, elevation. The change from a three-inch to a five-inch elevation in this machine structure, is clearly merely a formal change.

The District Court clearly erred in holding these claims patentable over the machine of the Northern Paper Company, and the Court of Appeals is clearly right in holding them anticipated.

In reference to these claims the Court of Appeals in this case says:

"The plaintiff does contend that claims 7 and 8 referring to adjusting the suction boxes so as to correspond with the pitch or declination of the wire are machine and machine improvement claims, but, apart from prior use, it is difficult to believe that such re-arrangement of suction boxes to enable them to perform their accustomed function of extracting water from the stock moving over the wire above, can be anything other than ordinary mechanical adjustment. We cannot believe that claims 7 and 8 in and of themselves involve invention. At any rate, prior use at the Northern Paper Company as early as 1904, effectually disposes of these claims."

It is to be noted that in the Remington-Martin suit Judge Ray found these claims to be invalid, saying:

"Claims 7 and 8 add to the declining wire the idea of having suction boxes also correspond in declination or arranged at different elevations to correspond in declination and elevation with the paper-making wire. This goes merely to an adaptation of such suction boxes to different heights and involves no invention. Suction boxes were old in the art. So means for increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly moving stock were common in this and in analogous arts and involves no invention" (226 Fed. Rep. 766).

The Court of Appeals for the Second Circuit in the Remington-Martin case found it unnecessary to pass upon claims 7 and 8 of the Eibel patent, thus in effect affirming the decision of Judge Ray respecting these claims. They have, therefore, never been sustained by any court except by the District Court in this case. That they are squarely anticipated by the prior use of the machine in the Northern Paper Company in which the suction boxes are attached to the continuous adjustable rails so as to be moved with them, as testified by Mr. Carter, and as held by the Court of Appeals in this case, is beyond question.

XVI.

ARGUMENT OF PATENTABILITY BASED ON USE.

Extent of Use Unsafe Criterion on Question of Patentability.

Practically the sole argument advanced in this case in support of the claim that it is a patentable invention to raise the pitch of an ordinary Fourdrinier machine from three or four inches, conceded to have been used before, to five inches or more, which it is claimed was first used by this patentee, is that after the adoption of a high pitch by the patentee Eibel, the owners of other machines throughout the country followed Eibel's

practice and gave a substantial pitch to the making wires of their machines.

It is claimed, in plaintiff's evidence, that fifteen paper mills in the United States are operating under licenses to use the alleged invention of the patent in suit, and that these fifteen licensed mills have a daily capacity of 3,400 tons of news paper. It is asserted that this is about two-thirds of the news paper manufactured in this country (Rec., pp. 35-36). The names of the licensed mills are given in the record (p. 36). It is admitted that the following named mills are stockholders in the company owning the Eibel patent. These are: Great Northern Paper Company, International Paper Company, St. Croix Paper Company, Berlin Mills Company, and the Laurentide Paper Company, generally designated, we understand, the "Big Five," and having a daily production of 2,200 tons of news paper per day. They make, therefore, practically two-thirds of the paper that is made under licenses, and nearly one-half of all the news print paper made in the country. The other ten licensed mills have together a total capacity of 1,200 tons per day.

It is apparent, therefore, that the so-called "Big Five," owners of the Eibel patent, pay a royalty to themselves for the use of the Eibel invention. This may be an easy way of absorbing profits, and keeping up the price of news paper.

When it was noised about that the biggest mills in the country were elevating their Fourdriniers, other mills naturally followed suit, just as one mill has always followed another in employing higher heads and longer and wider wires. The natural purpose of making all these changes was to increase the production of the machines. An increase in production naturally follows the use of a higher head, a longer wire, a wider wire, more power, or other changes noted by Mr. Lansing in his statement of the development of the Fourdrinier machine (Rec., pp. 646-648).

As it costs nothing for the owners of the Eibel patent—the

five big mills—to pay a royalty to themselves upon their own production, they were perfectly willing to do so, as this led other manufacturers to pay them a tribute for the use of the alleged Eibel invention. We think the decision sustaining the Eibel patent in the Circuit Court of Appeals of the Second Circuit, was principally induced by the showing that 2,600 tons of news paper were being manufactured daily in the United States under licenses from the plaintiff. The attention of the court in that suit was not directed to the fact that of the 2,600 tons of paper referred to, 2,200 tons were being manufactured by mills owned by the owners of the Eibel patent.

Notwithstanding, however, that the International Paper Company is one of the owners of the Eibel patent, we find that in 1918, it abandoned the so-called Eibel invention on two of its machines, and went back to the use of a high head and a flat wire, without lessening the speed or production of its machines.

The courts have long recognized that extensive commercial use is an unsafe criterion of invention.

In *McClain v. Ortmayer*, 141 U. S. 419, 35 L. Ed. 800, the Supreme Court, in a decision by Mr. Justice Brown, said:

"Counsel for the plaintiff in the case under consideration has argued most earnestly that the only practical test of invention is the effect of the device upon the useful arts—in other words, that utility is the sole test of invention, and, inferentially at least, that the utility of a device is conclusively proven by the extent to which it has gone into general use.

* * * * * * * * * * *

While this court has held in a number of cases, even so late as *Magowan v. New York Belt. & Pack. Co.*, decided at the present term, that in a doubtful case the fact that a patented article had gone into general use is evidence of its utility, it is not conclusive even of that—much less of its patentable novelty."

In *National Sweeper Co. v. Bissell Carpet Sweeper Co.*, 249 Fed. 196, the Circuit Court of Appeals for the Second Circuit, in a decision by Judge Learned Hand, said:

"The plaintiff must rely, therefore, and, indeed, it does largely rely, upon the success which its sweeper has attained, and we are forced, therefore, to a consideration of the propriety of that test here. It is true that the books are full of cases in which courts have regarded the success of the plaintiff's patent as an important test of invention, and we are in no sense disposed to question its value in proper cases. Yet it is a hazardous rule, and one which is quite likely to result in confusing genuine invention with imagination in advertising and energy and business skill in promotion."

In *National Machine Corp. v. Bental Co.*, 241 Fed. 72, Judge Pritchard speaking for the Circuit Court of Appeals for the Fourth Circuit, said:

"Great stress in the brief of complainant, as well as the argument, is laid upon the alleged fact that commercial use in this instance should turn the scale in its favor. We do not think this a safe criterion to guide us in ascertaining the questions presented to us in this case."

In the recent case of *Harvey Hubbell Inc. v. General Electric Co.*, 267 Fed. 564, the Circuit Court of Appeals for the Second Circuit, in a decision by Judge Hough, said:

"Much of plaintiff's case as to range of equivalents, existence of invention, and interpretation of claims rests on commercial success and we are especially referred, not only to the language but the facts of *Benjamin etc. Co. v. Northwestern etc. Co.*, 251 Fed. 288, 163 C. C. A. 444. See also *Stanley Works Co. v. Twisted Wire Co.*, 256 Fed. 101, 167 C. C. A. 340. Before success in business becomes available as evidence to aid in proving the fact of invention, or to extend the construction of words, it must be proved to have flowed from the claims in suit. A claim is for means, and those means must be proved to have been the means of success."

Applying this rule to the present case the sole basis for the assertion of patentability is in the so-called "substantial" pitch of the making wire of the old machine. No other change in means is suggested, and the change is only that from the three or four-inch pitch, concededly found in the prior art to a five or six-inch pitch, asserted to be the "substantial" pitch, of the patent in suit. The increase in speed and increase in capacity

of machines to which the higher pitch was applied is not shown to be due to this change. Mr. Lansing has pointed out many other changes required besides the increase in pitch to bring about an increase of speed or production (Rec., pp. 646-648). This witness who has had vast experience in the building of paper machines has testified in reference to the employment of higher pitches—

"I have failed to see one machine that has ever made greater speed than the same machine was producing before it was raised, providing that that machine was a machine that was built properly and was attaining and could attain high speeds before the raise was put on" (Rec., p. 666).

Plaintiff's witness, Talbot, whose testimony is relied upon to show that the speed of machines at the St. Croix Paper Company, was increased after the making wires were given a higher pitch, acknowledged that many other changes were made in the machines, and that improvements were also made in the pulp "getting it more suitable to making paper" (Rec., pp. 115-117).

In the recent case of *New York Scaffolding Co. v. Liebel-Binney Construction Co.*, this Court, in a decision by Mr. Justice McKenna, said:

"The utility of this construction (that of the patent) is the final assertion. * * * However, we may concede to counsel, for the sake of the argument, all of the uses and excellences of the patent, even though not discerned by Henderson (the patentee); but his pretension, whether at first hand or second—his or those of counsel—must be subjected to the test and estimate of the prior art; and, so subjecting them, we can discern no exercise of invention. The changes were simply mechanical, easy to discern, and as easy to make; incidental entirely to the main idea of Murray, which was, as was declared by him, to provide a scaffold that would 'permit of adjustment at any height during the construction of a building or the repairing thereof,'" etc.

See also *Grinnell Washing Machine Co. v. Johnson*, 247 U. S. 426.

The Circuit Court of Appeals for the Seventh Circuit, in a recent case, has said:

"While commercial success may be helpful in resolving doubt as to novelty and invention, its persuasiveness may be more or less diluted, when causes other than that of novelty of the article apparently and materially contribute to the success."

Advance Auto Accessories Corp. v. Reflex Auto Accessories Co., 284 Fed. 117, 119.

In the present case the change from the prior art machines, particularly the change from the Barrett & Horne patent No. 691,333, is "simply mechanical, easy to discern and as easy to make." It is merely a change in the proportionate lengths of the adjusting screws and the suspending cables. It is admitted that the Bayless-Austin machine, constructed in conformity with this patent, the drawing of which is in the record as Defendant's Exhibit V-5, has means for giving the making wire a pitch of at least three inches, above the level and three inches below—a total adjustment of six inches. Both the builder of the machine—the Horne Company—and the user of the machine—the Bayless Company—testify that these parts were so proportioned that the wire could be given a pitch of five or six inches above the level. Assuming, however, that, as constructed, three inches was the limit of the pitch above the level that could be given to the wire, it must be conceded that the change of two inches, or more, in the length of the adjusting screws or a change in the point of connection between the screws and the frame so as to make the adjustment all above the level, was merely mechanical and formal, and such change, it is submitted, did not require invention, even though an increase in the speed of the machine followed an increase in the amount of pitch that could be obtained with the longer screws.

The Court of Appeals, in this case, while stating that it recognized the importance of practical commercial success in cases in which that principle may be properly invoked, held that on the showing before the court in this case, which it in-

ferred was not before the court in the Remington-Martin case, "no very great weight can be attached to the extent of the commercial use attained" (Rec., p. 205).

We submit that this holding is correct. It is at most only in cases where the question of patentability is in doubt that commercial success is ever to be considered. Certainly in the present case, interpreting the Eibel patent in accordance with plaintiff's views as covering the mere increase in the pitch of an old Fourdrinier machine from the 3 or 4 inches of the prior art. to 5 or 6 inches, or more, with no change in result except a change in degree, is so clearly unpatentable that no amount of use or commercial success can confer patentability upon a change of this kind.

XVII.

PRIOR PATENT COVERING DEFENDANT'S MACHINES.

Defendant's Machine Built Under Savery Patent No. 742,239 Now Expired.

The four Fourdrinier machines, owned and operated by the defendant, are shown by the testimony in the record to have been constructed under and in accordance with Letters Patent No. 742,239, issued October 27th, 1903, to T. H. Savery (Barlow Rec., p. 221), nearly three years prior to the Eibel patent in suit. A copy of this patent is in the record (p. 1052). The machine as constructed is provided with adjusting screws 9 (see Figure 2 of the drawings), for raising and lowering the bearings of the breast-roll 7, thereby changing the pitch of inclination of the making wire. There is no limitation as to the length of these screws in the Savery patent. Davis a witness for defendant testifies that the screws used in building machines under this patent would give a pitch above the level of about 5 inches; or the screws could be set to divide the adjustment partly above and partly below level (Rec., p. 819).

By using the screws 9 of sufficient length any desired adjustment can be given to the breast-roll, and any desired pitch to the making wire. Instead, however, of getting the desired elevation of the breast-roll by means of the adjusting screws, inclined blocks have been placed under the forward (right-hand in the patent) legs of the machines in defendant's mill, thereby raising the forward part of the frame so as to give the desired elevation to the breast-roll and the desired pitch to the wire (see Drawings, Defendant's Exhibit A, Sheet 127, and Exhibit D, Sheet 131, Rec., following p. 1084).

Obviously, under many decisions of this Court, which hold that a patentee, during the life of his patent, and the public after its expiration, is entitled to all of the uses to which the patented machine may be put, without re-organization, the patentee of the Savery patent, or a user to whom the patentee has sold the machines, cannot, by the owner of a later patent, be deprived of the right to make formal changes in the machine, such as lengthening the adjusting screws, to permit a wider range of adjustment to the breast-roll; nor can he be deprived of the right of resorting to the old expedient, shown to have been used by Dickinson at Lisbon Falls as early as 1902, of getting a greater adjustment of the pitch of the wire by placing blocks under the legs of the machine at its breast-roll end.

This is all that the defendant has done in this case, and in thus changing the adjustment of the breast-roll and wire of its machines, constructed under this prior Savery patent, defendant is proceeding within its rights as defined by this Court in numerous cases, some of which we have cited in this brief (pp. 86-89).

Plaintiff does not question the fact that defendant's machines are, in all their details, the machines of the expired Savery patent, No. 734,239. Plaintiff concedes that if defendant uses these machines standing on a level floor or base it does not infringe any claim of the Eibel patent. It concedes also that

if defendant uses the machines with the breast-roll raised, by the adjusting screws 9 shown in the patent, so as to give the wire a pitch of not to exceed 4 inches, or if it puts blocks not more than 4 inches high under the forward legs of the machine, so as to give the wire a 4-inch pitch, it does not infringe any claim of the Eibel patent; but plaintiff asserts that if defendant increases the length of the adjusting screws 9 of the Savery patent, and, by means thereof, raises the breast-roll 5 inches or more, so as to give the making wire a pitch of not less than 5 inches, or if it puts blocks under the forward legs of the machine that are 5 inches or more in height, and thereby raises the breast-roll 5 inches or more, giving a corresponding pitch to the making wire, it then infringes the Eibel patent.

It is submitted that the mere statement of this proposition, which is in effect the gist of this controversy, shows the absurdity of plaintiff's position and claim.

Defendant contends that having the right to use the machines of the Savery patent, it has the right to lengthen their breast-roll adjusting screws 9, so as to increase the amount of elevation that can be given to the breast-roll, and the consequent pitch to the wire, to any desired extent, and that, it being old to use blocks under the legs of such a machine to adjust the breast-roll, for the purpose of pitching the wire, defendant may resort to this old expedient by placing blocks of any desired height under the legs of its machines of the Savery patent.

XVIII.

PLAINTIFF'S BRIEF IN THIS COURT.

Consideration of Certain of Plaintiff's Arguments.

The foregoing pages of this brief were written, and substantially all in type, before a copy of the brief for plaintiff-appellant was received by defendant's counsel. While we believe that

we have stated quite fully our own position in reference to the principal matters discussed in plaintiff's brief there are some statements made by plaintiff to which we desire to call attention.

AMOUNT OF PITCH "CONCEDED" BY PLAINTIFF.

In the opinion of the Court of Appeals in this case, it is said:

"The parties are in sharp and irreconcilable conflict as to the construction to be put upon the claims in suit. The plaintiff construes claims 1, 2, 3 and 12 as process claims, and contends that the words 'substantial elevation' in claims 1 and 3 and 'high elevation' in claim 2 cover any elevation of the breast-roll of the paper-making wire appreciably greater than that shown in the prior art, contended to be any elevation exceeding 5, or at any rate 6, inches. Plaintiff's expert testifies that a 5-inch pitch would not necessarily be the Eibel invention, 'but it might be on the border line'; that he hardly thinks a 4-inch pitch would involve the Eibel invention. *It is therefore conceded by the plaintiff that the prior art shows pitches of 3 or 4 and perhaps 5 inches.* Consequently, plaintiff contends that the words 'substantial elevation' and 'high elevation' in these claims cover all pitches an inch or more in excess of the pitches shown in the prior art" (Rec., p. 196).

Again the Court of Appeals said:

"Now, as already stated, the plaintiff admits that the prior art shows elevations of 4, and perhaps 5, inches in the breast-roll end. The plaintiff is, therefore, necessitated to contend that the words 'substantial elevation' and 'high elevation' mean something in appreciable excess of the prior art elevation. The result is that, in effect, the plaintiff claims that if the prior art shows pitches of 4 inches, then 5 inches is Eibel's invention; that if the prior art shows 5 inches, then 6 inches is Eibel's invention" (Rec., p. 198).

In their brief in this Court counsel say:

"We have never conceded, as the Court several times asserts * * * that pitches of 4 and perhaps 5 inches were used in the prior art. We absolutely deny and have always denied that any pitch greater than 2 or 3 inches was ever used" (Plaintiff's Brief, pp. 155-156).

And again:

"Neither Aldrich nor we have ever admitted or believed that

a pitch of 4 or 5 inches was used for any purpose before Eibel" (p. 156; see also pages 60, 91, 98, 129).

Turning to the testimony of Mr. Aldrich we find the following:

"A. I should say six inches might be the Eibel invention.

XQ46. Is six inches the limit?

A. I would not say that less than five inches would constitute the Eibel invention, because something approximating that has been shown to have been in use previously, but for the different purpose of drainage" (Rec., p. 42).

"XQ133. But you might operate the Eibel invention with a 4-inch elevation of the breast-roll?

A. I hardly think that four inches could be considered as a substantial pitch.

XQ144. Why not?

A. *Because Eibel in his specifications attempts to differentiate the pitch that he has in mind from what had been previously used when he specifies that it is to be substantial*" (Rec., p. 53).

Here is a clear-cut statement by plaintiff's expert, first, that he would not say that "less than 5 inches would constitute the Eibel invention, *because something approximating that has been shown to have been in use previously*," and, second, that he did not think that four inches could be considered as a "substantial pitch," not that there would be any difference between the action of a 4-inch pitch and a 5-inch pitch, but because "*Eibel attempts to differentiate the pitch that he has in mind from what has been previously used when he specifies that it is to be substantial.*"

It seems to us that these are concessions by plaintiff's expert, that fully bear out the statement of the Court of Appeals above quoted. The Court unquestionably took the statement of Mr. Aldrich to the effect that "something approximating" five inches had been used before, to mean, as it clearly does, that four inches, "and perhaps 5" had been so used.

It is submitted, therefore, that plaintiff's expert has con-

ceded all that has been stated by the Court of Appeals upon this point.

PLAINTIFF ALSO CONCEDES 4-INCH PITCHES PUBLIC PROPERTY.

Upon page 174 of plaintiff's brief in this Court, we read:

"The defendant and everyone else is perfectly free as far as the Eibel patent is concerned to run like the Lisbon Falls machine with a 3 or 4 inch pitch."

This certainly is a plain concession that a 4-inch pitch is open to the public. If so, why? It is not because there is any "critical point" between a 4-inch pitch, open to the public, and a 5-inch pitch, within the Eibel patent, because no one has ever claimed that there was any difference, except a mere difference in degree, between the action of a 4-inch pitch and the action of a 5-inch pitch, and Mr. Aldrich has freely admitted, in the testimony quoted by us, on page 5 of this brief, that there will be an acceleration of the stock down the wire with a 2-inch pitch, a 5-inch pitch, and a 6-inch pitch, differing in each case only in matter of degree. Counsel must concede, therefore, that the 4-inch pitch is open to the public because it had been used before Eibel, the very reason stated by Aldrich, as the Court clearly understood, and not because there is any difference except a slight difference in degree between a 4-inch pitch and a 5-inch pitch.

EFFECT WOULD NOT BE DIFFERENT IF 3 INCHES WERE HIGHEST PITCH OF PRIOR ART.

Plaintiff's counsel devote nearly 100 pages of their brief to analyzing and criticising the evidence in the record, relating to prior patents and machines, for the purpose of showing that a 3-inch elevation, above the level, was the most that ever was, or could be, obtained from prior art constructions.

We may say frankly that we have been unable to understand

why such strenuous efforts are put forth by counsel in an attempt to hold the testimony of prior art uses to a limit of 3 inches above the level, when their own expert concedes that the stock on the wire will be accelerated in just the same way with a 3-inch pitch, or a 5-inch pitch, the difference in acceleration of the stock between a 3-inch pitch, and a 4-inch pitch, or between a 4-inch pitch, and a 5-inch pitch, not exceeding, under like conditions, 15 feet per minute (see pages 130-131 of this brief); the 3-inch pitch being conceded by counsel to have been used in numerous prior art machines, the 4-inch pitch being conceded by plaintiff's expert Aldrich to have been used before Eibel; the 5-inch pitch being claimed by both counsel and expert to be on the border line, and the 6-inch pitch, used in defendant's No. 2 machine (differing again only slightly in degree from the 5-inch pitch), being claimed to be clearly Eibel, and covered by the claims of the Eibel patent.

PLAINTIFF'S DISCUSSION OF PRIOR ART.

We shall also refer briefly to portions of plaintiff's brief that deal with the Barrett & Horne patent No. 691,333, and with certain prior art machines already discussed in the preceding pages of this brief.

The Barrett & Horne Patent.

Plaintiff does not pretend that the structure disclosed in this patent is not entirely capable, without re-organization, of having its making wire adjusted to such a pitch as will cause the stock to be accelerated by gravity, due to pitch, to at least as great an extent as is done in any of defendant's machines, and it must be conceded that no change whatever in the machine is required to accomplish this result, except a mere lengthening of the threads on the adjusting screws, and, possibly, an increase in the length of the slots in the standards in which the hooks

move that connect the lifting cables to the frame of the machine.

The Eibel patent is a patent on a *machine* which differs in no respect from any ordinary Fourdrinier machine except that the breast-roll end of the making wire is elevated, or jacked up, five inches or more, by any suitable means.

The Barrett & Horne patent discloses exactly such a machine, with means for elevating the breast-roll end of the making wire to any extent desired, to be determined by the requirements of the user. The only criticism of this patent in plaintiff's brief is that the drawings do not show an adjustment possibility, either up or down, greater than 2 or 3 inches (Plaintiff's Brief, p. 70). Certainly neither these patentees, nor the public since the expiration of the Barrett & Horne patent, can be limited to a mere matter of inches in the length of the adjusting screws to be used in this machine for carrying out the described purpose of raising and lowering the breast-roll end of the making wire, and thereby giving a greater or less slant or pitch to the wire. It is conceded, as we understand plaintiff's position, that if the adjusting screws in this machine were longer, and the slots in the standards in which the hooks, moved by the screws, travel were also longer this patent would be a complete anticipation of the Eibel patent in suit.

Bayless-Austin Machines.

Plaintiff's counsel in their brief pick out, and comment upon, some disconnected answers and statements of witnesses respecting these machines, which were admittedly made under and in substantial accordance with the Barrett & Horne patent referred to in the last preceding paragraph. It is claimed that the machines, as installed, were capable of being adjusted above the level only 3 inches, although it seems to be admitted in plaintiff's brief (p. 187), that the breast-roll of these machines could be adjusted 3 inches above the level, and 3 inches below

the level. It is perfectly obvious, and is shown by testimony of witnesses, that in all of these machines the total amount of their adjustment can readily be set so as to be usable wholly above the level, wholly below the level, or in any desired proportion above and below (Rec., p. 819). Barrett, who designed and built the machine, testified that it was capable of being adjusted 6 inches above the level, and 2 inches below the level (Rec., p. 70). As to the amount of the adjustment, Barrett is corroborated by Horne (Rec., p. 752), and by Bayless, of the Bayless Pulp & Paper Company, for whom the machine was built. Bayless testifies that when he ordered the machine he told Horne he "*wanted and must have a machine in which the wire would shake the same top and bottom, and that we could raise and lower it in accordance with the kind of paper we were making*" (Rec., p. 704). Referring to the adjusting device on the machine, which is like that shown in the Barrett & Horne patent No. 691,333, Bayless says:

"This device was to enable us to run the machine with a 6-inch pitch, up to a 6-inch pitch, and also to depress it some below the level if we were obliged to run it that way, or if advisable to run it that way on account of extremely heavy weights of paper" (Rec., p. 706).

That this adjustment was put on this machine for the purpose of increasing the speed, cannot be doubted. Bayless refers to a machine that he had used at Binghamton with the pitched wire, and says "*we proposed to run these machines at a much higher speed than the Binghamton speed, and consequently I wanted more pitch than I had on the Binghamton machine for light weight paper*" (Rec., p. 705).

To say, as plaintiff's counsel do in their brief, in view of this testimony, that neither the Barrett & Horne patent, nor the machine built for Bayless under that patent, was capable of an adjustment above the level of more than a scant two or three inches, or that, in the provision of this adjustment of the machine, the question of speed was not considered, is simply with-

out justification by the facts of the record. It is true, in reference to the Bayless machines, that the witness Barrett having testified that certain drawings were not made for working drawings, was asked to state what the adjustment of the parts would be, *if the machine had been made in exact accordance with these drawings*, and he stated that it would be *3 inches above the level and 3 inches below* (Rec., pp. 811-812). This would be a total adjustment of the breast-roll end of the machine of 6 inches, and, as we have explained, in machines of this character, the adjusting device on the machine, could always be arranged so as to have all, or any part, of the adjustment either above or below level (Rec., p. 804). Barrett knows that this machine was designed for an adjustment of 6 inches above the level, and 2 inches below, and has no doubt but that it was so constructed, but the amount that it could be adjusted either above or below the level depended as he has explained on the position where the hook was fastened onto the shake plate (Rec., p. 804). So that Barrett's testimony, quoted on page 187 of plaintiff's brief, fully supports his previous testimony that the machine was designed to be adjusted 6 inches above the level, to give the wire a 6-inch pitch, and is entirely in harmony with that of Bayless who has testified that the machine as delivered was capable of such adjustment; that the purpose of the adjustment was to enable him to run the machine at a greater speed when making light paper (Rec., p. 705).

The Bayless machine is not only, therefore, a prior machine, capable of being adjusted so as to give the wire a 6-inch pitch, equal to that now used on defendant's No. 2 machine, but the user of this machine, had a full conception of adjusting the pitch of the making wire, so as to produce speed equality between the stock and the wire, in order to form a better sheet.

Kimberly-Clark Machines.

Plaintiff's counsel in their brief, give it as their opinion, from the testimony, that these machines could not be adjusted more than 2½ to 3 inches above the level "with an approximately equal adjustment below the level" (Brief, p. 192). The machines are now running just as they were installed in 1904, with the breast-roll adjusted 5½ inches above the level. Plaintiff's counsel say that this could not have been done with the original adjusting screws. We do not concede this, because it is the positive testimony of witnesses who know the device that the adjusting screws in these machines have never been changed. It is admitted, in plaintiff's brief, that the machines, as installed, were capable of an adjustment of from 2½ to 3 inches above the level and approximately the same amount below. This admission is all that is necessary to establish the fact that the machine can be given a pitch of 5½ inches above the level. By proper connection of the parts, this machine, like the machine of the Savery patent No. 742,239 (Davis Rec., p. 819); or the machine of the Barrett & Horne patent (Barrett Rec., p. 804), can have its entire adjustment set so that all of it can be above the level, or all below, or any desired part above, and the rest below, as we have explained.

An examination of the testimony of the witnesses respecting the Kimberly-Clark machines, shows conclusively that these machines *as they now exist* were built and installed in 1904, and as installed they were capable of being given a 5½ inch pitch above the level, *at which they are now operating.* It is not claimed by defendant that they have always been run at this pitch. These machines are adjustable, so that they can be given a high pitch, when speeded up to make light paper, or a lower pitch when driven at a slower speed to make heavy paper; their capacity for adjustment was the same when they were installed in 1904, as it is now.

While it is clear that the machines as originally installed were capable of being adjusted to the 5½-inch pitch at which they are now running, we think it would be immaterial, even if it were true, that the original adjusting screws were not capable of adjusting the breast-roll more than 2½ inches above level, and approximately the same amount below level, as claimed by counsel in their brief (Brief, p. 192), or that the original screws have been replaced by longer screws. This, however, is not the fact. The machines have not been changed since they were installed in 1904.

The Lisbon Falls Machines.

These machines are now being operated with a pitch of 4 inches and a speed of 530 f. p. m. The evidence shows that they are old and very light machines, installed prior to 1891. There is not the slightest reason to doubt the evidence of the superintendent, Dickinson, who testifies that they were originally pitched 1½ inches, by means of the adjusting screws provided on the machines, and that in 1902, he put 2-inch blocks under the legs of the machines thereby getting a total pitch of 3½ inches. Dickinson produced his diary in which he had a memoranda of the 1½-inch pitch in October, 1900, and of the blocking up of the No. 2 machine in June, 1902 (Rec., pp. 728-729). This gave the machines, at that time, a 3½-inch pitch, which has been increased only one-half inch since 1902. Dickinson fixes the time when this other half inch was added to the pitch as 1904 or 1905.

Moreover, Dickinson had an appreciation and understanding of the relation between pitch of the wire and speed equality between stock and wire, for he testifies that he had cross waves in the sheet, and blocked up the machines so as to have a pitched wire to get rid of the cross waves (Rec., p. 730).

Bayless, Kimberly-Clark and Lisbon Falls Machines Still Running as They Were Prior to Eibel's Alleged Invention.

These machines were all running just as they are now, prior to the date of Eibel's alleged invention. The Lisbon Falls and the Kimberly-Clark machines are in the same condition that they were at that time, excepting for ordinary repairs. The Bayless machines were damaged by a flood and damaged parts were replaced, but no change in plan of the machines was made.

The Barrett & Horne patent, and the drawings of the original Bayless machines have been produced. One of these drawings is in the record (following page 1092). A drawing of the Kimberly-Clark machine is also in the record (following page 1092). A detail of the adjusting device of the Kimberly-Clark machine is shown in the Moore & White patent No. 684,081 (Rec., p. 1058). As shown in the drawings of this patent it will be obvious that any desired adjustment can be given to the breast-roll end of this machine, merely by having the adjusting screws shown in the drawings of the patent of suitable length.

It is useless to attempt to classify the testimony respecting the details of these three machines, which have been in existence and have been constantly operated by the same men who have testified in reference to them, since the dates of their respective installations, as mere matters of memory. These men are now and always have been familiar with the construction of these machines. They are not testifying as to unaided recollection. The machines are still in existence and the witnesses have lived with them all these years, and know how they operate, and why.

The Bagley & Sewall Machines.

We have stated the facts in reference to the Bagley & Sewall machines in previous pages of this brief (pp. 104-108). We

have shown that the contract for the Raymondville machine provided an adjustment for the breast-roll end of the Fourdrinier "from level to 3 inches above level." Lansing testified that this adjustment "will give one-half inch more than the contract, with the possibility of reaching four inches" (Rec., p. 653). Later Lansing testified that measuring the possible adjustment on the blue print showed 3¼ inches (Rec., p. 658). Lansing did not, however, qualify his original testimony; that the adjustment on this machine, as built, was 3½ inches, and could be pushed to 4 inches (Rec., p. 658, XQ98).

Carter, in making his diagram of the Bagley & Sewall machine properly took Lansing's statement of an adjustment of 3½ inches. Plaintiff's counsel, who throughout their brief, without the slightest reason therefor, speak slightingly and unfairly of Carter, on page 202, mis-state Lansing's testimony, which was, and is, that the adjustment of the machine was 3½ inches, and then add, the wholly unfair statement that "Defendant's expert Carter, with his usual policy of adding a little for the benefit of the defendant, calls it three and one-half inches in his diagram."

We have not claimed for the Bagley & Sewall machines, at any time, a greater pitch than 3½ inches. This amount of pitch was clearly provided by the adjustment upon the Raymondville machine as Lansing testifies. The Bagley & Sewall machines with a 3-inch pitch, as the evidence clearly shows, were operating generally, as early as 1905, at speeds of from 500 to 550 feet. In 1917, after they had been given the so-called Eibel pitch they were not running any faster (H. C. Kinne, p. 637).

It will be unnecessary to refer to plaintiff's discussion of the other prior art machines. Plaintiff has made a labored and unsuccessful effort to show that no one prior to Eibel had used machines having a greater pitch than 3 inches, although, as we have seen, plaintiff's expert has definitely admitted the prior

use of 4-inch pitches, and of something approximating 5-inch pitches, and plaintiff's counsel, in their brief, concede that 4-inch pitches are open to the public.

We have, in previous pages of this brief, pointed out what is shown in the record in reference to each of the prior uses, and we consider it sufficient, at this point of the discussion, and in reply to plaintiff's criticism, to state that the evidence respecting the Bayless, the Kimberly-Clark, the Lisbon Falls and the Bagley & Sewall machines, establishes, beyond question the following:

(1) The Bayless machines were constructed so as to be capable of an adjustment of 6 inches above the level, their construction being substantially that shown in the Barrett & Horne patent No. 691,333; and they were operated with the making wire elevated by means of the adjusting mechanism to provide pitches, at various times, of from 4 to 6 inches. The purpose of this adjustment was to enable the flow of the stock to be equalized with the speed of the wire, so that the machine could be run faster in making light paper, as explained by Mr. Bayless in his testimony.

(2) The Kimberly-Clark machines, installed in 1904, were provided with adjusting devices capable of adjusting the wire to 5½ inches above the level. These machines were run at various pitches, and at various speeds from time to time, as shown by the testimony, in accordance with the character of the paper being made. At the time the witnesses were examined in respect to these machines in 1917, they were being operated with a pitch of 5½ inches, and this pitch was attained with the same adjusting mechanism that was on the machines when they were installed in 1904. The purpose of providing the adjusting device on the Kimberly-Clark machines was to permit the wire to be adjusted for the different pitches, in accordance with the character of the paper being made, the higher pitch to be used when the machine was running fastest, in the making of light-

weight paper.

(3) The Lisbon Falls machines, have always made news paper. They have run at speeds in excess of 500 feet per minute, at least since 1902, and definitely negative the testimony of plaintiff's witnesses to the effect that in 1906, at the time of the alleged Eibel invention, news print machines were not being run, at least regularly, at speeds in excess of 400 to 450 feet. Dickinson fully understood the purpose of using a pitched wire to avoid ripples or waves in the paper, and he had been doing this on these machines, for at least five years before the date of the alleged Eibel invention.

(4) The Bagley & Sewall machines, which were generally run at speeds of 500 feet per minute and in excess thereof, also definitely negative plaintiff's claim that the maximum speed for news paper machines at the time of the alleged Eibel invention was 400 and 450 feet. They also establish beyond question the use of pitches of 3½ inches.

COURT OF APPEALS FOUND IT UNNECESSARY TO REVIEW PRIOR ART TESTIMONY.

In view of the admissions of plaintiff's expert, which we have noted above, the Court of Appeals, in this case, was fully justified in saying:

"We have not found it necessary to review in detail the great mass of evidence concerning prior uses, for, in the view we take of the case, the plaintiff's own admissions as to the nature and extent of 4 or 5-inch prior uses conclude the point in defendant's favor" (Rec., p. 203).

This Court was also correct in saying:

"Plaintiff's expert testifies that he hardly thinks 'that 4 inches could be considered as a substantial pitch.'

Q. Why not?

A. Because Eibel in his specification attempts to differentiate the pitch he has in mind from what had been previously used when he specified that it is to be substantial.

We cannot accept the theory underlying this testimony. It amounts to saying that a 5-inch pitch is not 'substantial' merely because the witness had discovered that 4-inch pitches had been in common use before Eibel. But it is plain that the difference between no pitch and a 4-inch pitch is as great as the difference between a 4-inch pitch and an 8-inch pitch" (Rec., p. 203).

In so holding the Court of Appeals was right. Plaintiff's various contentions all go to show that there is no "critical point" where there is any change in principle between what is old in the art and what plaintiff asserts is covered by the Eibel patent in suit. When defendant adjusted its No. 2 machine to a 6-inch pitch plaintiff's expert, and plaintiff's counsel, placed the limit of the Eibel patent at a 5 or 6-inch pitch, just low enough to include this No. 2 machine as so adjusted with no reason for this particular limit except to cover adjustments defendant was using.

There is no new principle in the Eibel patent, as plaintiff construes the claims, but merely the application of the old idea of using a pitched wire, to make the stock run faster and prevent ripples and waves, as understood and practiced by Bayless, Dickinson and others long before Eibel's date.

Various Claims Made by Plaintiff's Expert and Counsel.

The Court of Appeals for the First Circuit in this case also says:

"The position learned counsel for the plaintiff are forced to take on this point (limit of the Eibel claim), but illustrates in striking form the otherwise perfectly clear proposition that the Eibel patent is nothing but an attempt to monopolize a difference in degree; that it is only a claim of an improvement in the method of adjusting and operating the machine so indefinite that its own proponents cannot state its limit" (Rec., p. 202).

The testimony of plaintiff's expert, and the statements in the briefs of plaintiff's counsel fully justify this statement of the court.

In his testimony plaintiff's expert Aldrich states that a manufacturer employing a 5-inch pitch of wire would *"practice the Eibel invention"* (XQ222, Rec., p. 68); that *"a machine having a five-inch pitch would be about on the border line of the Eibel invention"* (XQ161, p. 58); that *"six inches might be the Eibel invention"* (XQ45, p. 42); that he *"would not say that less than five inches would constitute the Eibel invention, because something approximating that has been shown to be in use previously"* (XQs45, 46, p. 42); that *"I hardly think that four inches could be considered as a substantial pitch * * * because Eibel in his specifications attempts to differentiate the pitch that he has in mind from what had been previously used when he specifies that it is to be substantial"* (XQs133-134, Rec., p. 53).

This testimony seems to make it quite clear that Aldrich regards the 5-inch pitch as Eibel invention, but on the border line, but that a 4-inch pitch is not to be regarded as the Eibel invention *because that had been used before Eibel; not because it operates any differently;* if it had not been used before it would be Eibel.

Now, if we turn to plaintiff's brief in this Court, we find ample justification for the statement of the Court of Appeals that we have quoted above.

On page 134 of this brief it is said that *"Eibel might properly have phrased his claims so as to cover the use of any pitch at all even as little as 2 or 3 inches * * * when the pitch is used * * * to accelerate the stock to speed equality with the wire."*

We take it that this is a definite admission that there is absolutely no difference between the operation of a pitch of 2 or 3 inches and a pitch of 4 or 5, or a greater number, of inches; *that even the lowest pitch will operate to accelerate the stock on the wire;* all of which is true as we have stated.

In sharp contradiction to this statement that the pitch of 2 or 3 inches might have been claimed to be within the principle

of the Eibel invention, so that Eibel could have phrased his claim to cover so small a pitch, is the following, which we quote from page 11, of counsel's brief in this Court:

"All of the witnesses agree that with less of a pitch than 5 or 6 inches no appreciable advantages can be obtained by way of speed increase on the machine, but that at pitches of about 6 inches material advantages in this direction begin to be attained."

It will be seen, however, that this last statement is absolutely not supported by the evidence. The reason given by plaintiff's expert why pitches prior to 5 inches do not come within the Eibel patent, is not that such pitches do not give the same advantage, only in less degree, as higher pitches, but merely that the pitches of less than 5 inches, or pitches of 4 inches, *had been used before Eibel*, and that Eibel *"attempts to differentiate the pitch that he has in mind from what had been previously used."*

Counsel for plaintiff, however, were so uncertain as to whether a 6-inch pitch was, or was not, within the Eibel invention that they suggested to the District Court that it was unnecessary for it to decide that question in this suit, a suggestion that the District Court promptly adopted. We now find plaintiff's counsel further suggesting in their brief (p. 100), *that if they are wrong in contending that a 6-inch pitch is within the Eibel invention this Court should at least sustain the patent to cover a 1½-inch pitch.*

We think, therefore, that these statements, of plaintiff's expert and counsel, clearly sustain the Court of Appeals in its statement, above quoted, that the alleged claim of the Eibel patent is merely for "an improvement in the method of adjusting and operating the machine so indefinite that its own proponents cannot state its limit."

PLAINTIFF'S COUNSEL ASSERT "EIBEL INVENTED A NEW MACHINE."

Plaintiff's counsel say in their brief in this Court that "Eibel invented a new machine" (pp. 148 and 157A).

According to the position of plaintiff's counsel, if one places 5-inch blocks under the front legs of the Savery patent, under which defendant's machines are constructed, he has converted the old Savery machine into a *New Machine*. It is no longer a Savery machine. It is now an "Eibel machine." If, however, these blocks are only 4 inches high the machine remains the old Savery machine. It is not then a "new machine."

It follows from this that if Savery blocks up his machines 3 or 4 inches he is within his rights. If he goes beyond this and blocks them up 5 inches or more he has converted the old Savery machine into a new Eibel machine, and is infringing the Eibel patent, and may be enjoined and compelled to remove the 5-inch blocks and put back the 3-inch blocks, although it is conceded that the effects of the 3-inch blocks and the 5-inch blocks are like in kind and differ only in degree.

Again, if Barrett & Horne lengthen the adjusting screws of their patent, so as to increase the lift of the breast-roll two inches more than what plaintiff asserts can be done with the screws shown in the patent, their machine is converted into a new Eibel machine. If the machine is used with the screen adjusted to a pitch of 5 inches or more it will infringe Eibel; if, on the contrary, it is adjusted so as to give the screen a pitch of four inches or less it does not infringe. We have, according to plaintiff, the anomalous situation of a machine that infringes a *machine patent*, if given one adjustment, and that does not infringe if given a slightly different adjustment. The same would be true of the Moore & White, or any of the other machines of the prior art.

We submit that the assertion in plaintiff's brief that "Eibel

invented a new machine," is manifestly unsound and absurd. Eibel does not make "a new machine" out of the machine of the Savery patent by merely putting blocks under its legs, or setting the machine on an inclined base; nor out of the machine of the Barrett & Horne patent by merely increasing the length of its adjusting screws.

The finding in the English decision that "*The patentee proposes no alteration in the machine itself; the machine remains identically what it was before*"; and the like finding by the Court of Appeals in this case that it "*cannot be contended that Eibel invented a new machine*" (Rec., p. 196), are both indisputable, no matter what plaintiff may now assert to the contrary.

PLAINTIFF ERRONEOUSLY ALLEGES EFFECT OF "OVERRUNNING" IN PRIOR ART MACHINES.

In their brief in this Court plaintiff's counsel argue that pitches used in the prior art would increase the difference of velocity between stock and wire (Brief, p. 83). Counsel for plaintiff are not willing to allow paper manufacturers prior to Eibel the exercise of even common sense in the operation of their machines. Having an adjustable pitch, an adjustable head, and an adjustable speed, counsel argue that operators of machines would adjust these factors so as to secure differences between speed of stock and wire, and that thereby they would produce rough sheets of paper. If a manufacturer had a machine, for instance, like that of the Barrett & Horne patent, used by Bayless, or like that of the Moore & White patent, used in the Kimberly-Clark mill, whether capable of adjustment above the level to a 3-inch limit, as asserted by plaintiff, or to a 6-inch limit, as testified by the witnesses, and capable of being run at various speeds, and with a flow box capable of giving a head of from 4 to 8 inches, it is reasonable to suppose that

such manufacturer would so adjust pitch and head as to produce a smooth sheet of paper at the speed at which he was running his machine.

By assuming that the highest heads and pitches, with which witnesses state the machines were provided, would be used when the machines were running at their lowest speeds, plaintiff's counsel figure that the operators of these early machines would have the stock on the wire running faster than the speed of the wire, and hence that they would invariably produce a poor quality of paper. As a matter of fact, of course, the effect of the testimony is that the highest heads and pitches were used with the highest speeds and vice versa. In reference to the Bayless-Austin machine Anderson testifies:

"Then after we had gotten systematized down to business and began to speed this machine up, we elevated this machine to about a 5-inch pitch and run it right around to 360 and 375 on 40 lb." (Rec., p. 693).

Anderson testifies that the slices were used as necessity required (Rec., p. 598), and Brown states that various depths of stock were carried in the pond behind the slices "on an average of about 3 to 4 inches" (Rec., p. 683).

It is absurd to suggest that any machine operator would flow the stock onto the wire at a speed so much greater than the speed of the wire as to produce a commotion in the stock; and Kinney has testified that there may be a variation of "fifty to one hundred feet or more" between the speed of the wire and the speed of the stock and still get a good formation of the sheet (Rec., p. 558).

We think that plaintiff's contention that operators of these machines would know so little about their action as to ever get an objectionable overrun when the same could be avoided by a mere adjustment of pitch or head in relation to the speed of the machine borders on the absurd. We think the language of the Court of Appeals applicable to this situation is fully justified by

the facts appearing in the record:

"It is incredible that a skilful operator of one of these great machines would have used a 3 or 4-inch pitch, with or without a substantial head, without paying some attention to the increased speed of the stock thereby induced. We agree with the contention of defendant's counsel that intelligent men in charge of such a machine would not operate it without discovering that commotion, ripples, and 'wildness' in the paper would result if the wire traveled at a speed relatively much faster than the speed attained by the stock through head and pitch, one or both. But the direct and affirmative evidence shows that there was prior appreciation of the principle which Eibel now claims as his own discovery" (Rec., p. 206).

It seems clear, therefore, that the statement in plaintiff's brief that the pitches employed in the prior art machines were actually objectionable on the ground of increasing the difference between speed of wire and speed of stock, is wholly unjustified by the facts in the record.

PLAINTIFF'S COUNSEL QUOTE DEFENDANT'S WITNESSES AS AGREEING THAT PITCH OF SIX INCHES IS "SUBSTANTIAL."

In their brief in this Court (pp. 137-140), plaintiff's counsel quote a number of defendant's witnesses as stating that a pitch of 6 inches is a "substantial pitch." At the same time counsel neglect to state that each of these witnesses testified that this "substantial" pitch had been used in paper making machines long before the date of the alleged Eibel invention. See Ross (Rec., pp. 354-357); White (Rec., pp. 628-629-630); Bayless (Rec., pp. 796-707); Hazel (Rec., p. 497); Devine (Rec., p. 235); Beyerl (Rec., pp. 266-267); Bowman (Rec., pp. 477-478).

White testified that his own machines were designed for a pitch of anywhere from 2 to 4 inches and could be adjusted to 6 inches (Rec., pp. 628-630). Plaintiff's counsel in their brief (p. 139), quote this witness as saying that the first machine built by his company designed for a 6-inch pitch was in 1912, but the witness had previously testified that the prior machines

could be adjusted for a 6-inch pitch, and that the only change made in 1912, to give even a greater adjustment, was to add to the length of the adjusting screws. In reference to what amount of pitch would constitute a "substantial" pitch, this witness testifies:

"I would call 6 inches a substantial pitch. I would call 4 inches a substantial pitch," etc. (Rec., p. 628).

We find, therefore, that each of the witnesses, called by defendant, who has designated a 5 or 6-inch pitch as a "substantial" pitch, has also testified that a substantial pitch had to his knowledge been used prior to the date of the alleged Eibel invention.

CLAIM IN PLAINTIFF'S BRIEF THAT REGULAR PRACTICE WAS TO RUN WIRES LEVEL OR EVEN UP HILL.

The statement is made on page 38 of plaintiff's brief in this Court that "the regular practice of the art at the date of Eibel's invention was to run with the wires level, or even up hill."

This statement is not supported by the evidence. Single answers are quoted from the depositions of defendant's witnesses, Thom, Ludwig and Bowman. In the answer quoted from Thom's testimony the record shows that he was referring, not to the practice at the date of the alleged Eibel invention, but the practice prior to 1902, when the pitched wire was put into the Kimberly-Clark Niagara mill (Rec., p. 341). Ludwig, also quoted, is referring to a date prior to the time when he began to work at Rhinelander, or sometime prior to 1904 (Rec., pp. 296-298), while Bowman is referring to the practice prior to 1899 (Rec., p. 477).

The statement in plaintiff's brief, therefore, is not supported by the record. The testimony to which we have referred in this brief shows beyond question that pitches from 3 to 6 inches were employed long before Eibel in the Bayless-Austin, the

Kimberly-Clark, the Lisbon Falls and many other mills, and that adjusting means capable of providing pitches of from 3 to 6 inches were furnished on the Barrett & Horne machines; from 2 to 4 inches on the Moore & White machine; and 3½ inches on the Bagley & Sewall machines, and that all of these pitches could be increased by merely changing the point of connection between the adjusting screws and the movable frame. Manufacturers realized, as Bayless has testified, that where it was desired to run the machines fast a greater pitch should be used, and, as testified by Dickinson, that the greater pitch would prevent cross waves in the sheet.

REMINGTON-MARTIN TESTIMONY NOT EVIDENCE IN THIS CASE.

We may note in passing that plaintiff refers repeatedly to the testimony of witnesses in the Remington-Martin suit as to prior art structures. The record in that case has been offered in evidence herein, and is competent as to any admissions it contains against the plaintiff herein. It may also properly be referred to for the purpose of determining upon what the Court of Appeals based its decision in that case. The testimony in that case, however, is obviously not evidence against this defendant, who was not a party to that suit, had nothing to do with it in any way, and cannot be bound by any statements respecting the prior art therein. Moreover, as we have pointed out, the Court of Appeals in the Remington-Martin suit, without question, misunderstood the testimony respecting the operation of the Willamette, and some of the other machines, referred to in its opinion.

PLAINTIFF CONCEDES PRINCIPAL PRIOR USES HERE WERE NOT BEFORE COURT IN REMINGTON-MARTIN SUIT.

Defendant herein relies upon uses in five paper mills, and prior sales by one machine manufacturing company, to show that all that this defendant is doing was known and in use prior to the date of the alleged Eibel invention. Defendant asserts that in the machines sold by the Bagley & Sewall Company, the machines used at the Bayless-Austin mill, the Kimberly-Clark mill (at Kimberly, Wisconsin), the Lisbon Falls mill, the Kimberly-Clark mill at Niagara, Wis., and the Palmers Falls mill, wires having pitches of from three to six inches were employed, with a head sufficiently high to produce the desired paper speed. There was no testimony in the Remington-Martin suit in reference to the first four of these machines, and no testimony respecting the arrangement and operation of the specific machines at Palmers Falls that are referred to by defendant's witnesses herein.

PLAINTIFF'S AUTHORITIES AS TO INDEFINITENESS OF CLAIMS.

The Court of Appeals in this case said:

"It will not do to assert, as plaintiff does, that 12-inch pitches are substantial and that 3 or 4-inch pitches (prior art) are negligible, leaving intervening pitches in limbo; a line must be drawn available, practically, if not mathematically. This case is thus plainly distinguished from such cases as *Vacuum Cleaner Co. v. A. Rot. Valve Co.*, 227 Fed. 998, and 239 Fed. 544, and *Carnegie Steel Co. v. Cambria Iron Co.*, 185 U. S. 403, and other cases cited by plaintiff on the question of indefiniteness. In all those cases a practically definite limit was stated. In the Eibel patent we find no such limit" (Rec., p. 202).

In none of the cases cited by plaintiff in the Court of Appeals, or in this Court, is the question of patentability made to turn upon a mere difference in degree of adjustment of a single element in an old combination, nor is there any case that sanctions an attempt to re-patent an old machine by merely varying the

extent of its adjustment, as by changing the length of adjusting screws, or similar elements. No one before Eibel has ever claimed that he made a new machine by merely adjusting an old one. Several of the claims cited in plaintiff's brief are process claims, and have practically no bearing upon the construction of the claims of the patent in suit, which is a patent upon a machine whose claims must be determined according to the rules applicable to machine patents.

An examination of the cases cited in plaintiff's brief will show that words referred to, such as "more or less" (*Krajewski v. Pharr*, 105 Fed. 541), were merely used to describe a single element in a comprehensive combination consisting of many elements; that patentability did not turn on such words as "more or less" or "substantial"; nor were such words relied on to differentiate the patented device from devices of the prior art. In the present case it is admitted that if the word "substantial" is omitted the *structure* defined in the Eibel patent differs in no respect whatever from structures of the prior art; and plaintiff defines "substantial" as including a 5-inch pitch and excluding a 4-inch pitch, not because of any statement of the specification, or because of any difference in operation, but merely because plaintiff claims that while the 4-inch pitch had been used before Eibel, the 5-inch pitch had not.

There is absolutely nothing in the authorities cited in plaintiff's brief that would justify the Court in sustaining the Eibel claims to cover pitches of 5 inches, or more, and holding that such pitches were definitely pointed out, and patentability distinguished by the claims from structures of 4 inches, or less, conceded to be prior art.

A careful examination of the authorities cited in plaintiff's brief shows that the Court of Appeals in this case is right, and that the authorities cited do not support plaintiff's position, but on the contrary clearly support defendant's position, and the decision of the Court of Appeals in this case.

PLAINTIFF'S STATEMENT THAT 6-INCH PITCH ON NO. 2 MACHINE TEMPORARY EXPEDIENT.

In their brief in this Court (p. 101) plaintiff's counsel assert that the 6-inch pitch on defendant's No. 2 machine is "a temporary expedient," adopted only for the purposes of this case, and to be abandoned as soon as the exigency passes.

The evidence in this case, produced by plaintiff's examination of a number of defendant's employees, showed conclusively that after being used for two and one-half years, it had been fully demonstrated that the 6-inch pitch on the No. 2 machine was better than the 13½-inch pitch on the other machines; that the machine gave less trouble, made more paper, that the paper sold at the same price and was, in the more important ways, better than the paper made with a higher pitch.

We do not wish to go outside of the record for argument of this case, but we believe that the accusation of temporary expedient made by plaintiff's counsel, justifies us in stating that there is no likelihood or probability that defendant will go back to the old 13½ (or 14) inch pitch under any circumstances, as about nine months ago, the pitch of the No. 2 machine was adjusted still lower to less than 5 inches, at which it has since been operated, with an increase in speed of from 50 to 75 feet per minute, and that since said date pitches of less than five inches have been adopted for all of defendant's other machines.

There is not the slightest basis for the assertion of plaintiff's counsel that when this litigation is ended defendant will raise the pitch of its No. 2 machine to what it was prior to the beginning of this suit.

STATEMENT IN DEFENDANT'S PRELIMINARY INJUNCTION BRIEF.

Plaintiff, on page 9 of its brief in this Court, quotes a statement made in the brief of defendant's counsel opposing the mo-

tion for a preliminary injunction that was filed with the bill of complaint herein. This brief was filed at the very beginning of this litigation, and when counsel for defendant, who wrote the brief referred to, was first called into this case, and before any opportunity had occurred to become familiar with the operation of machines of this character, or for ascertaining the prior art. This statement was, as will be seen from an examination thereof, based upon plaintiff's allegation that machines with flat wires, or small pitches, could be run at speeds not to exceed 400 or 450 feet per minute. If these statements made by plaintiff had been correct, as to which defendant's counsel at that time was not sufficiently informed to be able to question, the change suggested would have affected defendant's output as stated.

Defendant learned later, however, that the statement thus made in the brief of its counsel was erroneous. Defendant knows today, as shown by this record, that machines can be run, at speeds equal to the highest speed ever employed by defendant prior to the beginning of this litigation, with low pitches; that with pitches of less than 5 inches, defendant's own machines can be run at speeds materially higher than were ever attained with the 13½-inch pitch used upon all of defendant's machines prior to the beginning of this suit.

This statement in defendant's brief, made before the facts appearing in this record were developed, seems unimportant.

PLAINTIFF'S REFERENCE TO THE ENGLISH DECISION.

In their brief in this Court (p. 162), plaintiff's counsel dispose of the decision of the British High Court of Justice, Chancery Division, holding the corresponding British patent to Eibel to be invalid, with the mere statement that "The patent, the issues, the record and the law involved were all different in that case, from those in this case." It will be seen, however,

by a reference to the report of the case "Illustrated Official Journal (patents) Supplement, June 21, 1911, p. 349" that these statements are incorrect. We have bound at the back of this brief a copy of the opinion of the Court, but we have not reproduced the full report of the case. A reference to the report, however, which reproduces the drawings as well as its specifications and claims, shows that the English patent is practically identical with the United States patent, and the report of the case, preceding the published opinion, shows that the principal issues now before this Court were before the English Court and were decided in favor of the defendant.

PRESENT FOURDRINIER MACHINE RESULT OF GENERAL EVOLUTION.

This record clearly shows that the present Fourdrinier machine is the result of a general and progressive evolution in all of its various parts and elements.

In the letter from the Laurentide Paper Company of October 11th, 1904, it is stated that the Bagley & Sewall machine therein referred to could have reached the 600-foot mark in speed if the machine had been provided with additional presses and driers. This means, of course, that the machine could not make paper faster than the driers and presses could take it away. In other words, there must be a correlation between the production of the sheet and the drying, pressing and winding of the same. It is obvious, too, that there must be a correlation between the amount and speed of the stock fed to the wire and the speed of the wire itself. This fact was recognized from the beginning. The earliest machines ran at a speed not to exceed 100 feet per minute. To prevent too great a difference between the speed of the stock flowing onto the wire and the speed of the wire, the wire was given an up-hill pitch, thereby causing the stock to run up-hill and the force of gravity to slow up its speed to approximate the speed of the wire. Then as machines were built

larger and stronger and were provided with better means for taking care of the formed sheet, the wires were run faster, and to preserve the proper relation between the speed of the stock and the speed of the wire the up-hill pitch of the wire was gradually decreased until finally the wires were run horizontally. Further development of the machine, permitting additional increase in speed, made it necessary in order to preserve the relation between speed of stock and speed of wire to pitch the wire down hill, and to increase the head in the flow box, thereby to cause the stock to travel faster on the wire and to be brought onto the wire at a higher initial speed.

Recognizing that different speeds required different pitches, manufacturers of machines such as the Barrett & Horne began to provide their machines with adjusting devices so that any user could adjust the height of his breast-roll as desired and thereby provide the making wire of his machine with the pitch that he desired to use. Similar provisions were made for adjusting the head of the stock in the flow box as well as the pitch of the wire, so that at the present day the factors of speed, head and pitch are all made adjustable to permit the operator to vary the same to suit the conditions under which his machines are operated. This fact is well illustrated by the testimony of defendant's foreman, Haddock, examined as a witness in this case by plaintiff. Asked if the depth of pond back of the slice (that is, the head) was about the same that he usually carried on the No. 1 machine, he replied:

"Just about the same; they vary. There is three machine tenders; not one wants that pond exactly the same; but as long as they get the paper I don't care where they carry it. One wants it higher, one lower. If they change it and make paper, I don't care" (Rec., p. 95).

We think that this testimony, with other testimony in this record, shows that changes in pitch are mere matters of adjustment, which operators are entitled to vary and increase or de-

crease as they may see fit, to bring about what they consider the best results, just as a miller would vary the feed of his grain to the speed of his rolls, the inclination and speed of his sieves or sifters, with a proper adjustment of the other various mechanisms that are employed in the making of flour. We quote again the following statement from the Court of Appeals in this case which seems, in the last analysis, to fully cover the situation before the Court:

"But whether a pitch of 14 inches does or does not produce more or better paper than a pitch of 6 inches, we think it clear that paper makers are entitled to interchange pitch with head or with drag, and to vary pitch or head in accordance with such judgment as, dealing with any quality of stock or any capacity of machine, they form, through the experimental processes constantly used by operators, in so adjusting their machinery as to produce the largest amount and the highest quality of paper" (Rec., p. 203).

CONCLUSION.

It is submitted in conclusion:

(1) That the claims of the patent in suit require, by their plain terms and the terms of the specification, that the so-called "substantial" pitch given to the making wire be such that gravity alone, due to pitch, brings about speed equality between the stock and the wire, and that this was the basis of the decision of the Circuit Court of Appeals for the Second Circuit sustaining the patent in the Remington-Martin case.

(2) Concededly, if this is the correct interpretation of these claims, defendant's machines do not infringe.

(3) Unless the word "substantial," and other like expressions in the specification and claims of the patent in suit, require a sufficient pitch to be given to the making wire to bring about speed equality between stock and wire by gravity due to pitch alone, these claims are invalid, under the statute, for the reasons hereinbefore pointed out.

(4) If the claims of the patent in suit are construed to cover

defendant's machines, in which speed equality between stock and wire is brought about mainly by the head in the flow box and the drag of the making wire, and only to a small extent by gravity due to the pitch of the wire, said claims are invalid, in view of the patents and machines of the prior art in which the same three factors were used in the same way, and in substantially the same proportions, to bring about this result.

(5) Claims 7 and 8 of the Eibel patent in suit are clearly anticipated by the prior machines of the Northern Paper Company.

(6) The decision of the Court of Appeals for the First Circuit is right and should be affirmed.

Respectfully submitted,

NATHAN HEARD,
RICHARD PAUL,
MAURICE M. MOORE,
Of Counsel.

AMASA C. PAUL,
LIVINGSTON GIFFORD,
For Defendant-Respondent.

IN THE HIGH COURT OF JUSTICE.—CHANCERY DIVISION.

Before MR. JUSTICE WARRINGTON.

March 28th, 29th, 30th, and 31st, and April 1st and 4th, 1911.

EUROPEAN EIBEL COMPANY LD. v. EDWARD LLOYD LD.

Patent.—Infringement.—Insufficient description of any invention.—Prior user.—Judgment for the Defendants.—Action dismissed with costs.

A machine for making paper for newspapers embodied a device by which water containing fibre or pulp in suspension (called the stock) was poured out through a "slice" on to an endless wire sieve kept continually moving. The water drained away through the sieve, and the pulp became felted and subsequently more thoroughly dried by the sieve passing over vacuum chambers. A patent for improvements in this machine claimed (stating it shortly) depressing the further end of the sieve so that the stock tended to flow down the sieve by the action of gravity, thus, as alleged, (a) diminishing the dragging effect which produces bad paper; (b) increasing the efficiency of the machine in bringing about the felting of the paper; and (c) enabling rolls of newspaper to be manufactured at a greatly increased rate of speed. In an action for infringement the Plaintiffs alleged (inter alia) that the Defendants had adopted the device of putting the sieve on a slope; and the Defendants alleged that the Patent was invalid on the grounds (inter alia) of want of subject-matter, insufficiency of Specification, and prior user at the Defendants' works.

Held, the Patent was invalid because the Specification did not sufficiently describe any invention at all; and that, if it did, there was prior user of the invention.

The action was dismissed with costs.

* * * * * * * * * * *

WARRINGTON, J.—I have had an opportunity of thinking over this case, and should gain no advantage by reserving judgment.

The action is one for infringement of a Patent for what the Patentee describes as "Improvements in connection with, and in the manufacture of paper on,

European Elbel Company Ld. v. Edward Lloyd Ld.

ourdrinier paper-making machines." The invention relates particularly to the anufacture of paper in large quantities for the purposes of newspapers, or erhaps I ought to say that is the practical application of the invention.

Rapidity of manufacture, consistently with a satisfactory quality of paper, is t the greatest possible importance, and the Plaintiffs claim that the patented ivention attains both these objects, and it is said that, until this invention, such apidity of manufacture as is now attained, with good quality of paper, was not nd could not have been attained before.

There is one other matter before I come to the facts more in detail. The atentee proposes no alteration in the machine itself; the machine remains lentically what it was before. He does not produce a new machine; all he uggests is what he considers a novel and useful mode of employing the old iachine to produce the same article.

I must say a few words about the machine, but I need say very little. We re concerned here with a small part only of the Fourdrinier machine, and that art consists essentially of an endless wire sieve, that is to say a sheet of woven ire, revolving round two rollers, one at each end, the one called the breast-oll, which I will speak of as the commencement, though that is not scientifically ccurate, of the journey, and the other the couch roll at the end of the journey. he wire sheet having run from the breast roll to the couch roll, passing in its ourse over what is called a guide roll, turns and comes back to its start. That ndless sieve runs at a constant speed, and it is at the same time agitated in a ateral direction causing a shaking movement in addition to the constant orward movement. On to that sieve is discharged, at the breast roll end, what s technically called the stock. The stock consists of water holding in suspension certain quantity of fibre. For the particular paper with which we have to do, t is wood fibre, but that really matters not at all. The stock is a highly liquid naterial having a quantity of small fibre floating about it; the proportion of vater to fibre may and does vary, but the proportion is a very large one. I hink Mr. **Dixon** put it at from 1 of fibre to something under 200 of water,—this s the outside, and I do not think it often comes quite up to that. At any rate the tock when it comes upon the breast-roll is in a highly liquid condition. The tock starts on the breast-roll with a certain velocity occasioned by the head rom which it starts, that is to say, it is kept in a vessel at a certain depth, it ssues from a slit in the lower part of the side of that vessel, and its velocity at he start depends, to a certain extent, upon the head with which it starts. It omes upon the sieve, it runs along that sieve, which is agitated backwards and orwards, the water drains through, and the fibres are left adhering to the sieve, nd at the end of the run the paper is made, that is to say, the felting action nas taken place; the fibres are deposited in a mass which makes a material of he nature of felt,—not a woven material but a material in the nature of felt,— nd the rest of the process really consists in pressing, drying, and completing the paper. But before the stock leaves the sieve, in addition to the drainage through the sieve itself, which removes what one may call the free water, the stock passes over some instruments called suction boxes, and the bulk of the remainder of the water is removed by the operation of a vacuum. It is essential to the proper making of paper by this process that the fibres should be deposited uniformly or with the greatest possible uniformity. Uniformity is what is aimed at, and not only that, but with the greatest possible variety of direction, in order, having regard to the latter essential, that the fibres shall be completely interlocked, and the paper not be so liable to tear as it would be if the fibre lay only in one direction. Those are the two things that have to be attained, and they are attained partly by the sidelong jig of the machine, and partly by the relative velocity of the stock and of the wire. I am quite satisfied

REPORTS OF PATENT, DESIGN, AND TRADE MARK CASES.

European Eibel Company Ld. v. Edward Lloyd Ld.

on the evidence, that, if such a thing were physically possible as to make the stock travel throughout its length at identically the same speed as the wire, the proper disposition of the fibres would not take place; there must be a relation other than equality, between the velocity of the stock and the velocity of the wire. I quite agree that the relative velocity, or rather the difference between the two velocities, must be small, and it is the art of a paper maker to obtain, amongst other things, the right relative velocity between the two.

With that preface I can come to what the Patentee claims to have done, but, before I actually come to the Specification I must say something about the facts and the public knowledge and the doings of paper-makers before the date of the Patent, including in the doings of paper-makers the doings of the Defendants, **Edward Lloyd Ld.**, who I am told are among the largest paper-makers in the world.

The Patent dates from the 22nd of August, 1906. Prior to that Fourdrinier machines had been made to a certain extent adjustable; that is to say, they were arranged so that the sieve might be run horizontally, or a little up-hill starting from the breast-roll, or a little down-hill starting from the breast-roll, but those variations in the inclination of the sieve had been made, not in relation to the speed at which the wire was running, but for the purpose of dealing efficiently in reference to drainage with different characters of stock. What I have just said with regard to the variation of inclination is not universally true, because I am satisfied that Messrs. **Lloyd** had done something more. I need not go in detail through what Messrs. **Lloyd** did in the year 1904, but I propose to state the conclusions of fact at which I arrive from the evidence. Messrs. **Lloyd** had three machines which they called Nos. 9, 10 and 11. They were, prior to the alterations which I am about to mention, running No. 9 at a speed of 450 feet per minute—a paper speed that is to say—producing at the far end 450 feet of paper per minute. They found that the paper so made was not satisfactory, and it occurred to their paper-maker that the reason of that might be that he was running the machine at an excessive speed, and was, therefore, disorganizing that proportion to which I have already referred, which ought to exist between the velocity of the stock and the velocity of the wire. Accordingly he put it back for a few days to a speed of 300 feet per minute, and during that period he found that he was making better paper. He then put it back to the 450 feet, and the paper which it then made was, as one might expect, not the satisfactory paper which it made at 300 feet, but the unsatisfactory paper which it had been making before. He wanted to run it at 450 feet if he could, for obvious reasons. He could not run it at a higher speed than that in any event, because he had not sufficient drying space, and he had no room in his machine shop for extending that drying space, but he wanted to run it up to the 450 feet and make good paper. He tried certain experiments on Nos. 10 and 11, consisting in raising the inclination of the sieve to an extent which was slight when compared with what he afterwards did with the No. 9 machine. He found that this improved his paper on those two machines, and he thought he would go a little further on No. 9. Accordingly he blocked up No. 9 until the inclination of the sieve was 4 9/16 inches at the breast-roll above the guide roll; that is to say, it ran down from 4 9/16 inches to nothing, and he found that with that inclination he could make at 450 feet per minute as good a paper as he could make at 300 feet per minute on the horizontal. In my opinion that is exactly equivalent to increasing his speed from 300 to 450, and proportionately increasing the elevation of his sieve: because the criterion is, the quality of paper which you can make. That showed him that he could at 450 feet make, with an elevation of 4 9/16, paper satisfying the conditions to which I have referred, which he could only make on the horizontal with a speed of 300 feet per minute.

REPORTS OF PATENT, DESIGN, AND TRADE MARK CASES.

European Eibel Company Ld. v. Edward Lloyd Ld.

that is what was done at Messrs. **Lloyd's** works. I am not forgetting that he made in reference to the three other machines, Nos. 5, 6 and 7, somewhat similar experiments, though the idea with regard to those machines was slightly different, namely, that of increasing the head and so getting an increased velocity in the stock. It is quite obvious, however, that the relative velocity of the stock and the sieve was present to the mind of Mr. **Martin,** the paper maker, who thus dealt with Messrs. **Lloyd's** machines. Before I leave this I want to mention one other thing, namely, that what he did with his machines was clearly not that slight adjustment which it will be found presently is referred to by the Patentee, because the machines themselves were not constructed to admit of the adjustment which he made; he was compelled to raise the entire frame of the machine by blocking it up. The effect of that was that the inclination was a steady decline from the breast-roll over the suction boxes down to the guide-roll, not to the couch-roll, because there is a slight variation of incline between the guide-roll and the couch-roll, with which I need not deal.

In that state of things the present Patentee comes and in general terms what he says is:—"I have discovered a mode by which you can make as good or better paper with a very much increased speed of production than you made at the lower speed, and I do it by so inclining the sieve or wire that I bring "into force the action of gravity." I think that the real question that I have to determine is, whether, in the Patentee's Specification, there is any defined invention at all, or whether he has not merely told the world that there is a certain relation between inclination of the sieve and speed of the machine, but has not told the world where, in the infinite scale of such varieties, his invention comes in?

I now turn to the Specification. In a sense it is extremely simple, but I cannot help thinking that what the Patentee conceives to be his invention is so simple that if he had said it in simple terms there would have been no invention at all, and he could not have described it, and he has therefore introduced into it a considerable amount of apparent complication with the idea that, if he did that, he might be taken to have described an invention which otherwise did not exist. He begins by saying:—"This invention consists in improvements in "the manufacture of paper on Fourdrinier machines and the adaptation of the "said machines for the purpose, and has for its object to enable the machine "to be run at a very much higher speed than heretofore and to produce paper "which is more uniform and well-formed and stronger than hitherto." I pause there for one moment. I think there is no sufficient evidence that the paper produced by the use of his invention is either more uniform, better formed, or stronger than paper made at the proper speed before his invention; and the whole point, if there is any point, in what he says about the better quality of the paper is that he can make the paper of a better quality at a higher speed than could be made at that higher speed without recourse to his alleged invention, namely, that of the incline of the wire. I do not think, on the evidence, that more than that can be said to be true, and I will assume for the moment that that is all he means. He then goes on to what he conceives, I think, to be the merit of his invention. He says: "Whilst the amount of suction required at the "suction boxes is lessened and the paper-making wire is therefore subjected to "less friction and lasts longer than hitherto and the suction boxes can, if desired, "be lessened in number." I do not find that that third object has been attained. I will say no more than that. I have certainly had no evidence which has satisfied me that the suction required at the suction boxes is lessened, still less that the suction boxes can be lessened in number. I have some evidence that with the use of his invention the wires last longer, but that is outside of the evidence which I have on that head.

REPORTS OF PATENT, DESIGN, AND TRADE MARK CASES.

European Eibel Company Ld. v. Edward Lloyd Ld.

Then the Patentee describes what he says his invention is. He say "According to my invention I carry the paper-making wire, and the surfa "over which it passes, at such an inclination downward from the breast-ro "where the paper-making stock first arrives on the said wire to beyond t "suction boxes—setting the suction boxes at an inclination corresponding "the inclination of the wire above them—that the paper-making stock travel "under the action of gravity, in the direction of movement of the paper-maki ' wire as, or practically as, fast as the paper-making wire moves throughout, ' practically throughout, the whole length of the portion of the wire on whi "the paper-making stock rests from beyond the breast-roll to beyond the suctio "boxes. The paper-making stock can thus be caused to travel more rapid "than the normal, or usual, speed of the paper-making wire hitherto use "for a given grade of paper-making stock, to effect increase in the output of th "machine, and the speed of the paper-making wire is increased so as to equa "or practically equal, the speed of the paper-making stock rapidly movin "under the action of gravity." I think that those two passages really show wh he conceives that he has invented, namely, by the action of gravity the bringin about the relation between the speed of the wire, and the speed of the stock, an bringing about the relation at a higher speed than that at which it had previ ously been the custom for paper-makers to run their machines, but in order s to describe what he thinks he has brought about he has gone much further, an and he has, I think, made statements which I think are not only scientificall but practically inaccurate. It is—I am speaking now only on the evidence—i my opinion a physical impossibility for the paper-making stock to travel unde the action of gravity at any particular pace throughout the whole length of th portion of the wire from the breast-roll to the suction boxes, and for the reaso that the force of gravity is a constantly accelerating force, and that until th force of gravity no longer practically exists—that is to say until the paper making stock adheres to the wire—the pace at which that stock is travelin must be constantly accelerating and cannot be, throughout the period, equal t the constant speed at which the sieve is running. What I think he really means although he does not say so—and for obvious reasons does not say so—is that b inclining the wire he is able to bring about a state of things so that with the un usual speed of the wire he gets the conditions necessary for the formation of goo paper; but that is not what he says. I think that, with a view of defining hi invention if he can, he has there made a suggestion which is not a true sug gestion in fact. I say this because, of course, if he could make out tha if you apply his invention, you get a good quality of felting between the tw things, he might then be able to say that he defines his invention. Then h proceeds a little further and says:—"The downward inclination of the paper "making wire from the breast-roll may be adjustable, or the speed of the said "wire may be adjustable, or both the downward inclination and the speed o "the said wire may be adjustable, in order that the velocity of the paper-making "stock and the speed of the paper-making wire can be readily made to equal, or "approximately equal, each other." That of course is nothing but a statement of any common manner by which you can elevate or depress the paper-making wire, or increase or decrease the speed of the machine. There is nothing practical in that. Then there is a passage on page 2, beginning at line 23:— "The paper-making wire a has usually been arranged to move in a horizontal "plane, although, in some machines, means have been provided for adjusting "the breast-roll end of the wire to different elevations to provide for dealing "with different grades of stock"—that is what I have already alluded to— "but the wire has never hitherto been so inclined as to cause the paper stock to "travel at such a speed, under the action of gravity, as to equal, or approximate

REPORTS OF PATENT, DESIGN, AND TRADE MARK CASES.

European Elbel Company Ld. v. Edward Lloyd Ld.

the speed of the wire, and in all previous methods of working, the wire has for a considerable portion of its length starting from the breast-roll drawn the stock along, in consequence of the wire moving much faster than the stock, and the stock has waved, or rippled, badly near the breast-roll end of the wire, which waving, or rippling, has gradually diminished until an equilibrium has been established and an even surface obtained, but not until the waving, or rippling, has ceased at some considerable distance from the breast-roll have the fibres become laid uniformly, and the machines have therefore necessarily been run slowly to give ample time for the water to escape and for the fibres to lay down so as to make a uniform sheet."

In one sense that is a perfectly true description, but under his invention exactly the same state of things takes place; you have the rippling to begin with followed by a state of quiescence, and before his invention you had that. His invention has not produced for the first time that state of quiescence. All that he has done is to bring about at the higher speed the same conditions that existed at the lower speed. I only say that for exactly the same reason that I made similar remarks with reference to the description on the first page. It cannot, in my opinion, be said that it has brought about a new state of things; all he has brought about is the same state of things at a higher speed of the machine. There is nothing more in the description that I need read except a passage at the top of page 3, where he says, "In practice I have found that good results are obtained by giving the breast-roll end of the wire d an elevation of from 7 inches to 18 inches above the couch-roll end of the wire a the said elevation depending upon the grade of stock employed and the speed at which the wire a is run, the higher the speed of the wire a is increased, the greater being the elevation." I only read that, because it adds nothing more to the knowledge he had already imparted at the bottom of page 1, and the top of page 2, that you were to incline your wire according to the speed at which you wished to run your machine; he had told you lower down on page 2 that what you had to aim at was getting the same quality of paper with the increased velocity of the two, and on this page he adds no further definition; he only tells you the maximum and minimum which he has found to give good results, but he does not say that the 7 inches is the minimum at which his invention comes into application, nor that 18 inches is the maximum. That is important on the point on which I now am, namely, whether he has defined any invention at all. The case might have been different if he had said:—"My invention 'does not come into operation until you have raised your breast-roll a certain 'definite number of inches." He does not say that. I really do not think there is anything more in the Specification that is necessary for me to read.

I now come to the Claims. He claims:—"A Fourdrinier paper-making 'machine having a paper-making wire, and the supports and suction boxes over 'which it passes"—those things, of course, are old; there is nothing in them—'at such a downward inclination from the breast-roll end that the paper-making 'stock will travel, under the action of gravity, in the direction in which the 'said wire travels at a speed the same as, or approximating, that of the wire, 'throughout, or practically throughout, the whole operative length of the said 'wire from the breast-roll to beyond the suction boxes, so as to give the 'advantage of being able to work the machine at an increased rate, sub-'stantially as hereinbefore described." And then there is a second Claim which is:—"The manufacture of paper on a Fourdrinier machine having the paper-'making wire declined so as to cause the paper-making stock to travel, under 'action of gravity, at a speed equal to, or approximating, that of the wire speeded "up to equal, or approximately equal, that of the paper-making stock." I think in those two Claims what he has really claimed is not an invention

REPORTS OF PATENT, DESIGN, AND TRADE MARK CASES.

European Eibel Company Ld. v. Edward Lloyd Ld.

which enables you to run the machine up to a certain speed, namely, a spee equal to or approximating the stock, but what he has really claimed is makin good paper running the machine at a much higher speed than had been don before. That, I think, is the real meaning of his Claim.

The fault, and, in my opinion, the fatal fault, in this Specification is that h has not told you where what he calls the action of gravity comes in so as t enable you to run at the greater speed which is the object at which he i aiming. He has left each paper-maker to find out for himself at what inclina tion, and at what speed, and with what other adjustments, such as th proportion of water to fibre, and the inches of the head, and so forth, he ca make the best paper whilst still increasing the speed at which he wa accustomed to run. He has given you, in my opinion, no criterion at al except the quality of the paper with the greater speed of the machine, and h has left you to find out for yourself at what point in the 90 degrees the actio of gravity, according to him, comes into operation.

In my opinion there is not a sufficient definition of any invention in thi Specification. If there were, then I think the conclusion would be inevitable that what Mr. **Martin** did in 1904 would be an infringement of it. Mr. **Martin** in 1904 did, in my judgment, on the facts, get at a speed higher than that at which he could possibly have run the machine in order to get a good quality of paper, a quality of paper such as he would have got at the lower speed. As I have already said, I think that is equivalent to his having run the stock at a greater speed, and speeded up his machine proportionately to the greater speed of the stock. If what Mr. **Martin** did in 1904 is within the Specification, and I think it plainly is within the Specification, and would, if it had taken place after 1904, be an infringement of the Patent, then even if the Specification does describe an invention, I think that there has been prior user.

Therefore the Patentee is in this dilemma:—if his Patent is a good one, there has been prior user; if the Defendants do not succeed in establishing the prior user then the Patent is invalid. In my opinion the Patent is invalid, because the Specification does not sufficiently describe any invention at all. There were other Objections raised but, of course, as I am in the Defendants favour on these two points I need not go into the others, but I have considered the Particulars of Objections, and I think that all of them were reasonable. The alleged anticipation I do not think has been made out, but I think the Particulars of Objections were reasonable, because I think one could hardly have satisfactorily dealt with the real objections upon which the case turns without having known what has been done by previous inventors on the same subject.

I think, therefore, that the only thing I can do is to give judgment for the Defendants with the costs of the action, and certify for the Particulars of Objections as being reasonable.

[redacted]

UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT.

EIBEL PROCESS COMPANY, PLAINTIFF-APPELLANT,
v.
REMINGTON-MARTIN COMPANY ET AL.,
DEFENDANTS-APPELLEES.

Before WARD *and* ROGERS, *Circuit Judges, and* MAYER, *District Judge.*

Appeal from a decree of the District Court for the Northern District of New York, dismissing a bill for infringement of patent to William Eibel No. 845,224, dated February 26, 1907, covering an improvement in Fourdrinier machines for making paper. Claims 1, 2, 3, 7, 8 and 12 are in controversy.

FREDERICK P. FISH, GUY CUNNINGHAM *and* HARRISON F. LYMAN *for Plaintiff-Appellant.*

FRANK L. CROCKER *for Defendants-Appellees.*

MAYER, J. The Fourdrinier machine has been known and used for over a hundred years and has attained an efficiency beyond which it is difficult to advance. It is the machine universally employed for making all except a few special sorts of paper.

In the following description we have adopted almost literally the language used by the expert, Arthur D. Little, in his admirably clear and concise exposition of the art.

The Fourdrinier is an aggregation of several sections, each composed of many parts, and each section performing a function which is in a sense independent, although for the production of a sheet of finished paper all these func-

tions are interdependent and must be co-ordinated. The first section of the machine has for its function the actual formation of the web, which is later to be transformed into the finished paper, and it does this by distributing the wet stock as uniformly as possible upon an endless wire-cloth sieve, to which, as it travels forward, a sidewise motion or "shake" is imparted to insure the felting and interlocking of the fibers as they are deposited upon the wire by the drainage through the wire of the water in which they were suspended, and this portion of the machine is further supplied with mechanical devices known as suction boxes over which the wire passes, and whose function is to compact the sheet by atmospheric pressure which forces into the box considerable additional water not removable by drainage.

The next great division or section of the Fourdrinier machine has for its purpose the compacting of the wet sheet by mechanical pressure under rollers, and the compacted sheet then passes continuously to the third section of the machine, the function of which is to dry the sheet, the drying being effected by carrying the sheet over the surface of heated metal cylinders or dryers.

The remaining sections of the Fourdrinier machine have for their object the "finishing" of the sheet by improving or smoothing its surface by means of heavy and highly polished steel rolls between which the sheet is passed.

It is primarily with the first section, that is, the sheet-forming section, known as the Fourdrinier part or wet end of the machine, that the Eibel process is concerned, which end of itself strictly, although not always popularly, speaking constitutes the Fourdrinier machine. This consists of:

1. A flow box into which is pumped a constant supply of the paper-making stock consisting usually of fibres of wet pulp with or without added mineral matter, the whole

being mixed with from 135 to 200 times its weight of water and having the appearance of diluted milk.

2. An endless wire sieve woven with sixty or seventy meshes to the inch in common practice and often seventy-five feet long and 100 inches or more wide, the whole traveling rapidly over the breast roll, which runs on a horizontal axis at the flow box end of the machine, and the couch roll likewise running on a horizontal axis at the further end of the machine from the flow box.

3. A supporting frame bearing a series of parallel horizontal rollers called table rolls between the breast roll and the couch roll, upon which table rolls the top or active portion of the traveling endless wire sieve is supported so as to present a plane but not necessarily horizontal surface for the reception of the stock.

4. An opening connected with the flow box called the "slice" opening through which the mixture of fiber and water called "stuff" or the "stock" flows on to the sieve in a stream the width of the desired sheet of paper. The stock is carried along on the sieve, draining off its water as it goes until before the couch roll is reached at the further end of the wire the greater part of the water has drained away and the paper in the form of a uniformly distributed wet pulp has sufficient strength to hold together and be carried through a series of pressing and drying rolls and calendars from which it is rolled up as complete paper.

5. Deckle straps consisting of endless rubber bands of square or rectangular section traveling at the speed of the wire are placed at each side of the wire in contact with the top of the same. They are supported on wheels above the wire so that their bottom side which is in contact with the wire runs along with it, the strap thus forming a wall which prevents the paper stock from running off at the sides of the wire.

6. About twenty feet from the breast roll a series of

suction boxes is placed beneath and in contact with the under surface of the wire. A partial vacuum is maintained within these boxes so that through the agency of the atmospheric pressure upon the upper surface of the we pulp a greater part of the water then remaining in the paper stock is forced out of the pulp into these boxes, so that very little free water remains in the wet web of paper after this has passed beyond the suction boxes.

These are the essential features of the Fourdrinier machine. It comprises in addition many supplementary details of construction and equipment. For instance, above the suction boxes in contact with the surface of the paper is a skeleton roller faced with wire cloth and called the "dandy roll" which gives to the upper surface of the paper substantially the same texture as the surface in contact with the paper-making wire.

Under the wire from the breast roll to the suction boxes are shallow boxes or trays for receiving the water which runs through the wire sieve. This water contains a considerable amount of fiber and of mineral matter—provided clay or similar materials have been used for loading; and to prevent waste this water carrying these materials in suspension is caught by these "savealls", as they are called, and pumped back again into the paper stock before it reaches the flow box.

The last roller for supporting the wire is larger than the others and is called the guide roll, since it is equipped with a device for automatically varying the position of the axis of this roll as may be necessary to keep the wire running straight. After the wire goes over the guide roll it drops to the couch roll at a different angle.

In addition and very important is the "shake", namely, means for shaking the whole front end of the machine sidewise to promote the interlocking and felting of the fibers during the process of deposition by drainage. The

motion of the shake is very rapid, say two or three times a second, and its amplitude may rarely amount to as much as one-half an inch.

Paper machines of the Fourdrinier type are very expensive, the cost of a news machine independent of its housing often reaching $100,000, so that, in order to earn a proper return upon this heavy investment, the paper-maker is forced to utilize to the utmost the productive capacity of the machine. The machines are constantly operated day and night, and every endeavor is made to run them at the highest speed consistent with the quality of merchantable paper desired under the conditions imposed by the character and quality of stock and the limitations of the particular machine itself. The desirability of securing the maximum production is, of course, obvious in case of any sort of paper, but where news paper is concerned, the low price of the product and the competition among the mills, with the resultant small margin of profit, make the question of output one of vital importance. With a given machine the total cost of labor and overhead charges is approximately the same whether the machine is producing twenty-five or thirty-five tons for twenty-four hours, so that if a machine normally rated for, say, twenty-five tons can have its production increased to thirty-five tons, the additional ten tons of paper thus gained is produced at little more than the cost of the materials entering into its composition.

In operating the machine, the paper stock in the flow box flows on to the paper-making wire at, or more commonly slightly beyond, the breast roll, the thickness of the stream flowing on to the wire being governed by a cross-bar extending across the entire width of the sheet of paper to be made, and at a height above the wire corresponding to the amount of stock which it is desired to flow upon the wire. This cross-bar is called the slice, and

it holds back the stock from the wire, so that only a stream of the desired thickness can escape from the flow box out under the slice on to the wire. The supply of stock is so adjusted that the stock in the flow box behind the slice extends some distance above the bottom of the slice, and therefore the stock flows out on to the wire under the pressure of a hydraulic head, which may be varied within certain limits if the paper-maker so desires. The original purpose of the slice was to keep the froth and chips, if any, upon the surface of the stock from flowing on to the wire and causing breakage of the paper with the loss of production incident thereto, but it has also the effect in so far as it assists in the maintenance of a hydraulic head of giving a substantial speed to the stock as it flows upon the wire. If the head in the flow box is, for example, two and a quarter inches, the speed with which the stock at the bottom of the stream will flow to the wire will be substantially 200 feet per minute.

Accordingly, if the paper-making wire under these conditions is run at a speed not exceeding 200 feet, the wire has no work to do in the way of causing the stock to attain the speed of the wire, since the stock starts at that speed, and, although it is true that even in that case the wire performs the work of drawing along the stock, yet the work is slight, as the wire has no inertia of the stock to overcome, but only the friction of the air. If, however, the wire runs at 400 feet a minute, as was a common speed for news machines, that is, machines making news paper, at the time of Eibel's invention, then the making wire would be moving at a speed twice that of the stock coming on to the wire under a head of two and a quarter inches, and the wire drawn out from under the paper stock, causing under these conditions waves and ripples, until the wire had by its friction given to the stock approximately the speed of the wire. Even when the stock starts at the

exact speed of the wire, ripples always occur in the first portions of the flow on the wire of any machine running at any speed which even approximates 200 feet per minute. Many factors prevent an instantaneous quiescence of the sheet of stock, and the quantitative influence of each at the start is difficult to measure. Among these factors are the irregularities caused by the rush of water from under the slice, the variations between the speeds of the top and bottom of the sheet of stock, the effect of the shake, which is greatest near the breast roll, and the effect of the drainage of water through the wire, which is also greatest immediately after the stock comes upon the wire, and causes irregularities of flow.

Accordingly, it is recognized by paper-makers that the sheet is necessarily more or less rippled for several feet from the slice, and any sheet smoothing out in that distance may be said to do so "at the start". As the machine is speeded up above 200 feet in case of machines with a horizontal wire, the wavy part extends further and further from the slice, and greater commotion is caused. This establishes a limit to the possible speed of the machine, for while waves and ripples, if confined to the beginning of the wire, have substantially no effect on the sheet, because of the great fluidity of the stock at this point, and the fact that the sheet has hardly begun to form, yet if the disturbed condition is allowed to extend too far down the wire to a point where the viscosity of the stock is increasing so rapidly as to prevent readjustment after an initial disturbance, the paper formed will be irregular, because that formed at the crest of the waves will be thick, and at the hollows very thin, and the proper interlacing of the fibers will be disturbed, or checked. At a further increased speed the paper, owing to these irregularities in structure, would break on the machine so often, causing so many delays and interruptions that no gain in production would

follow from the increased speed. Eibel recognized that the variation of speed between stock and wire was the chief cause of this long extending commotion of the stock on the wire, which made the paper uneven in texture and strength, and caused breaks, and thus limited the increase in machine speeds, and this invention relates to the remedy.

Eibel announced what he believed was a new principle of operation as follows:—

> "In accordance with my invention I operate entirely above the level to cause the stock to travel by gravity at a velocity approximately equal to the speed of the making-wire, which I believe to be a new principle of operation."

He recognized and understood what had been done in the art in this respect up to his time, for in his specification he explained:—

> "The Fourdrinier wire has usually been arranged to move in a horizontal plane, although I am aware that means have been provided for adjusting the breast-roll end of the wire to different elevations, usually below the level, to provide for running with different grades of stock—as, for instance, with quick stock and slow stock; but so far as I am aware the making-wire has always had to perform the work of drawing along the stock, and as the wire moved much faster than the stock the stock waved or rippled badly near the breast-roll end of the wire, which gradually diminished until an equilibrium was established and a smooth, even, and glassy surface presented, and not until the waving or rippling ceased did the fibers lay down uniformly and produce a well-formed sheet of paper. The machine has been run necessarily at a low rate of speed to give ample time for the water

to escape and for the fibers to lay down so as to make a uniform sheet, and in case the time was insufficient the breast-roll end of the wire has been lowered still farther until the desired result was accomplished."

The prior art showed instances where the pitch of the wire had been two or three inches and in two isolated cases up to six inches; but, as soon as the Eibel process became known, its principle was extensively adopted and applied so that today Eibel's process is the practice of the art.

The testimony is that 2,600 tons of news paper are manufactured daily in the United States in accordance with the Eibel patent and the machines have been speeded up from an average of 400 to 450 feet per minute to over 680 feet per minute; and that speed may, at any time, be exceeded, for the only limits which remain are certain practical factors such as strength of machine parts, drying capacity and ability of the workmen in handling the paper.

In short, the commercial success has been wide and pronounced in an art where time means money and increased production at practically no increased expense reflects itself in increased profits.

Among the tributes to the efficacy of the invention are the two infringing machines of defendant, in one of which the wire has a pitch of eighteen inches from breast roll to guide roll and in the other a pitch of twenty inches, enabling the speed to reach about 550 and 575 feet respectively per minute.

We are satisfied from the evidence that Eibel was the first to instruct the art in a new principle of operation and we agree with the conclusions of the district judge, when he pointed out succinctly what Eibel had accomplished:—

"So far as I have been able to discover, no one claims to have discovered the advantages of having

the wire carrying the stock and the stock move together at substantisIly the same speed, the stock impelled by gravity and directed by the wire, and to have embodied such idea and principle of operation in a patent, or an application for a patent, prior to the application by Eibel. This idea, so far as Letters Patent are concerned, appears to have been evolved by Eibel.

"It was urged . . . that it was not ivnention to ascertain and fix the degree of incline and ascertain by experiment the best method of paper making by means of a moving wire so adjusted. The rule is invoked that it is not invention to improve in degree merely on a principle of operation old in the art. This may be conceded, but I think Eibel discovered and practically disclosed much more than this. He not only elevated the breast-roll end of the paper-making wire but regulated the speed at which the wire should move, making it move at equal speed with the stock, so that there is no obstruction to the natural flow of the stock under the influence of gravity and consequently no eddies and ripples and uneven laying down of the fibers."

The district judge, however, held the patent void in view of the disclosures of previous patents and of prior uses and intimated that the la'.guage of the claims was "indefinite" and "uncertain". These claims are as follows:—

"1. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a *substantial* elevation above the level, whereby the stock is caused to travel by gravity, *rapidly*, in the direction of movement of the wire, and at a speed approximately equal to the speed of the wire, substantially as described.

"2. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a *high* elevation, whereby the stock is caused to travel by gravity *faster* than the normal speed of the wire for a certain grade of stock, and having means for increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the *rapidly-moving* stock, substantially as described.

"3. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, the breast-roll end of the wire being maintained at a *substantial* elevation above the level, whereby the stock is caused to travel by gravity, *rapidly*, in the direction of movement of the wire and at a speed approximately equal to the speed of the wire, substantially as described."

"7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction boxes supported at a corresponding declination, substantially as described.

"8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction-boxes arranged at different elevations, substantially as described."

"12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated that the velocity of the stock down the declining wire, caused by gravity, is so related to the velocity of the wire in the same direction that waves and ripples on the stock are substantially avoided and the fibers deposited with substantial uniformity on the wire, substantially as described."

We will now consider, (1) prior patents; (2) prior use and (3) validity of the claims as drawn.

(1) The prior patents. Six United States and ten foreign patents were received in evidence. All show means for effecting a slight adjustment of the breast roll and none amounts to more than an illustration of the drainage adjustment which Eibel fully understood and referred to in his patent. The patents demonstrate that skilled men prior to Eibel did not appreciate the possibility of raising the breast roll end of the machine more than an inch or two and that none of them had the faintest conception of the principle of operation which characterizes the Eibel invention.

(2) Prior use. We think it is clearly established that no one of the alleged prior users had any understanding or appreciation of the Eibel principle. The question then remains whether as matter of fact the Eibel principle was operated and whether, therefore, his contribution is merely an improvement representing an advance in degree.

Eight prior uses were testified to. Three of these (Rhinelander, Wisconsin, Palmer Falls, New York, and Niagara Falls, New York) do not merit discussion.

The use at Stockton, California, the latest date of which was 1892, must be regarded as an abandoned experiment, and the pitch of one and one-half inches as an unsuccessful temporary expedient. The highest speed attained was 250 feet per minute and the regular speed 220 feet per minute.

Willamette Company, at Oregon City, Oregon. Here there were five machines having pitches of two inches in some instances and three inches in others.

When the Eibel patent was issued only two of these machines were carrying pitches, and the best speed was from 400 to 450 feet.

On August 4, 1907, about five months after the issue of

the Eibel patent, the wires were elevated on the various machines from eight to over twenty inches, with a resultant increase of speed from 400 or 450 feet to from 500 to over 680 feet.

Warner, a machine tender and presumably expert man, referring to conditions at the Willamette mill said:—

> "We were continuously trying to form a better sheet, to make an increase in the speed that they were calling for. They wanted more speed, and at the same time they wanted as good a grade of paper. We puzzled our brains over the business to find a way to meet the requirements. . . .
>
> "Our mill wasn't paying very well, and we were wild to increase our product, and trying all manner of schemes to increase the speed of the machines, that we might make some profit off the mills."

Nothing could be more convincing of the futility of a so-called use than the failure by expert practical men to accomplish a desired result and the discarding of an old method and the adoption of a new one immediately upon its advent.

Remington-Martin at Norfolk, N. Y. When the Eibel patent was issued, the Remington-Martin machines were running flat, *i. e.*, with horizontal wires. Shortly thereafter, high pitches were adopted.

Raymondville at Raymondville, N. Y. There is testimony that one machine was running at a pitch of three inches in 1903 and that in October of that year an additional three inches was added, but the experiment was unsuccessful, for as the superintendent testified, "the machine tender had a lot of trouble and when I asked what the matter was he said he thought if I had raised the machine a little higher it would not run at all". The best proof of the failure of this effort is the fact that the production fell off.

Finally, Northern Paper Company at Green Bay, Wisconsin. The most that the evidence shows as to this use, is that a pitch of not to exceed six inches was tried for two weeks or less and abandoned.

Within the limits of an opinion, it is not possible to analyze the testimony as to prior use in further detail. We think the evidence establishes that no one before Eibel had any knowledge of his theory that, where not abandoned, the slight pitches were used, in most instances, to bring stock to the dandy roll more quickly than when the horizontal wire was used, thus giving it less time to drain and causing it to reach the dandy roll in a more fluid condition; and, in any event, if there remained any doubt as to patentable novelty, that doubt would be resolved in this case in favor of the patent by commercial utility.

Tilghman v. *Proctor*, 102 U. S. 707, 711.
Hillard v. *Fisher Book Typewriter Co.*, 159 F. R. 439, 441.
Borgfeldt Stripping Machine Co. v. *Universal Tobacco Machine Co.*, 215 F. R. 715.

(3) Indefiniteness of claims. It is urged that the use in Claims 1, 2 and 3 of such words as "substantial elevation", "high elevation" and "rapidly" renders the claims void for indefiniteness and uncertainty.

It is apparent that Eibel's invention is not susceptible of definition in terms of inches or feet per minute. As Little testified:—

> "The exact speed for any particular pitch was something which could not be accurately determined in advance, owing to the variations in stock used, paper desired and construction of machines. Such determination is not, in fact, necessary. The grade is to be arranged to give a rapid gravity flow of the stock, and the machine then speeded up to meet it as long as the sheet remains smooth."

Any attempt to define lower and upper limits would have been an invitation to infringers.

The practical workers in the art had no difficulty in understanding that the pitch must be higher than three or four inches, and that the pitch of the wire and the wire speed must be so correlated that gravity will accelerate the stock to speed equality with the wire.

It is difficult to lay down a rule and it is best to confine the test of indefiniteness to the facts of a particular case. Where, as here, the principle of operation is made clear, the pitch is substantially higher than that theretofore known in the art, a different result is accomplished, the subject-matter is incapable of exact expression in feet and inches and the worker in the art has no difficulty in following the directions, then a claim using the phraseology of Claims 1, 2 and 3 will not be held valid.

Any other construction might readily result in depriving a meritorious invention of its commercial value.

Carnegie Steel Co. v. *Cambria Iron Co.*, 185 F. R. 403, 437.

Woerheide v. *H. W. Johns-Manville Co.*, 215 F. R. 604; affi'd, 220 F.R. 674.

In this connection our attention is called by appellants to the opinion of the High Court of Justice, Chancery Division, in *European Eibel Co., Ld.*, v. *Edward Lloyd, Ld.*, reported in The Illustrated Official Journal (Patents) Supplement, June 21, 1911, page 349, and by appellants to the action of the German Patent Office.

While the opinions of foreign courts may often be helpful, the record before us does not afford the means for an accurate comparison of the issues and proof which were before the English court and those here presented, and, indeed, there is enough to indicate that there were some differences.

Haskell Golf Ball Co. v. *Sporting Goods Sales Co.*, 210 F. R. 628.

In patent cases especially, differences of opinion may readily arise because of the nature of the subject-matter.

Mast, Foos & Co. v. *Stover Co.*, 177 U. S. 488.
Baldwin v. *Abercrombie*, 228 F. R. 895.

As we conclude that Claims 1, 2 and 3 are valid and infringed, we deem it unnecessary, for the purposes of this case, to pass on Claims 7, 8 and 12.

The decree is reversed with costs.

UNITED STATES DISTRICT COURT

DISTRICT OF MAINE

IN EQUITY. No. 769

EIBEL PROCESS COMPANY

v.

MINNESOTA & ONTARIO PAPER COMPANY.

OPINION OF THE COURT.

September 30, 1920.

HALE, DISTRICT JUDGE: This is a suit in equity to enjoin the infringement of United States letters patent to William Eibel No. 845,224, dated February 26th, 1907, for an improvement in Fourdrinier paper-making machines. The patent seeks to construct and arrange such machines so that they may be run at a higher speed and produce a more uniform sheet of paper. For many years the Fourdrinier machine has been the best known and most widely used paper-making machine. In describing it, I follow substantially the plaintiff's details. It consists, primarily, of an endless wire-cloth sieve, or "wire," passed over a series of rolls at a constant speed. At the "breast-roll" end,—or wet end,—of this wire there is discharged upon it from the "flow-box," or "pond," a constant stream of paper-making stock, consisting generally of fibres of wood pulp, mixed with from 135 to 200 times their weight of water, and having the appearance of diluted milk. This sieve is woven with 60 or 70 meshes to the inch, and may be 75 feet long and 100 inches or more wide. As it travels forward, the fibres are deposited upon the wire, as the water drains out, the wire being given a sidewise thrust or

"shake" to insure their proper felting and interlocking. The stock is carried along, on the wire, draining off its water as it goes, until the "couch-rolls" at the further end of the wire are reached. The stock is pressed between the "couch-rolls," and then, in the form of a uniformly distributed wet pulp, is strong enough to hold together, and be carried through a series of pressing and drying rolls and calendars, which constitute the "dry-end" of the machine. In order to aid in the extraction of the water from the pulp, there is placed, somewhere about 20 feet from the "breast-roll," a series of "suction-boxes" beneath and in contact with the under surface of the wire; a partial vacuum is maintained within these boxes so that the greater part of the water remaining in the paper stock is sucked out into the boxes, and very little free water remains in the wet web of paper after it has passed beyond this point.

There are many details of construction to which attention is called; the "flow-box" is the box in which the stock is stored up and from which it is discharged upon the moving wires, through the "slice," namely the horizontal gate extending across the wire, by raising which the stock is discharged from the "flow-box" upon the wire, in a stream having the width of the desired sheet of paper, and having a thickness dependent upon the height of the "slice" opening. The "deckle-straps" are rubber bands, resting upon the wire at each side of the stream of pulp; they travel with the wire, so as to form lateral walls, to confine the stream of stock until it has reached a condition of such dryness that it no longer tends to flow. The "table-rolls" are a series of parallel, horizontal rollers between the "breast-roll" and the "couch-roll," upon which the active portion of the wire is supported so as to present a plane surface. The "dandy-roll" is a roller, faced with the wire cloth, placed above the wire at a point beyond the first suction box and in contact with the upper

surface of the paper; it imparts to the upper surface of the paper a texture similar to that which the lower surface receives from its contact with the wire. This "dandy-roll" may also carry the design which impresses the water-mark in the sheet, in case a water-mark is desired. The last roller for supporting the wire is larger than the others and is called a "guide-roll", since it is equipped with a device for automatically varying the position of its axis so as to guide the wire and keep it running straight. After the wire passes over the "guide-roll" it drops at an angle below horizontal to the "couch-roll." Fourdrinier machines are very expensive; and so, for purpose of economy, they are operated day and night; and it is the constant endeavor of all paper manufacturers to run these machines at the utmost possible speed consistent with the production of good paper.

Prior to Eibel,—as the proofs show—450 feet of paper per minute was the substantial maximum at which good paper could be made. At speeds exceeding this limit, great commotion was caused in the stock on the wire; so that the paper formed was uneven, or "wild"; it had waves, ripples and wrinkles in it, during the critical period while the paper was forming, thus preventing an even formation. If higher speed was attempted the sheet would sometimes break, stopping the machine.

The plaintiff says that Eibel made the discovery that the reason for this commotion of the stock, when high speeds were given to the wire, was the excessive difference of speed between the wire and the stock; and that such commotion could be avoided if the stock could be speeded up to equal the wire speed, at the point where active paper formation begins.

Eibel observed—so plaintiff alleges—that so long as the actual difference between stock speed and wire speed did not exceed, say, 100 feet per minute, there was no great

trouble, because the "drag" or friction of the wire was sufficient to accelerate the stock to such an extent that speed equality and the consequent quiescence of stock was accomplished before the stock lost its fluid character; he saw the reason why "wild" paper was produced at high speed to be that there was too great a difference between stock speed and wire speed to be overcome by "drag", and that the under part of the liquid was dragged along faster than the upper part, thus causing waves and ripples; in order to meet these conditions, Eibel gave the wire "a sharp, downward pitch from the 'breast-roll' to the 'guide-roll'; and thus called in the aid of gravitation to speed up the stock on the wire, and to bring it up to speed equality with the wire", his effort being to use gravity, in correlation with the other elements then in use, with the purpose of making the stock catch up with the speed of the wire. The plaintiff contends that the above is substantially Eibel's inventive thought. Translating that thought into a machine, he took the old Fourdrinier machine, and raised the "breast-roll" end to a substantial elevation above the level. As a process, plaintiff says that Eibel's invention consists in giving a rapid flow of stock under the influence of gravity, due to a substantial wire pitch, and correlating this pitch with the speed of the wire in such a way that the initial difference of velocity between stock and wire is overcome under the influence of gravity, so that the waves and ripples, which would otherwise be present at the point of paper formation, are done away with. And plaintiff urges that Eibel had in mind the fact that small elevations of the wire had, up to that time, been used; but that these pitches were mainly for drainage requirements; and that no one had conceived the idea of applying a substantial elevation of the "breast-roll" end of the wire to the purpose to which he applied it.

In his specification Eibel calls attention to the prior art as follows:

> "The Fourdrinier wire has usually been arranged to move in a horizontal plane, although I am aware that means have been provided for adjusting the breast-roll end of the wire to different elevations, usually below the level, to provide for running with different grades of stock—as, for instance, with quick stock and slow stock; but so far as I am aware the making-wire has always had to perform the work of drawing along the stock, and as the wire moved much faster than the stock, the stock waved or rippled badly near the breast-roll end of the wire, which gradually diminished until and equilibrium was established and a smooth, even, and glassy surface presented, and not until the waving or rippling ceased did the fibres lay down uniformly and produce a well-formed sheet of paper. The machine has been run necessarily at a slow rate of speed to give ample time for the water to escape and for the fibres to lay down so as to make a uniform sheet, and in case the time was insufficient, the breast-roll end of the wire has been lowered still farther until the desired result was accomplished. In accordance with my invention I operate entirely above the level to cause the stock to travel by gravity at a velocity approximately equal to the speed of the making-wire, which I believe to be a new principle of operation."

He thus points out with some detail what his invention is:

> "My invention is embodied, essentially, in the first part or element of the machine having the Fourdrinier wire or paper-making wire, and consists in causing the stock to travel by gravity in the direction of move-

ment of the making-wire and approximately as fast as the making-wire moves, thereby resulting in a "gravity-feed" for the machine. The stock may be, and preferably is, caused to travel more rapidly than the normal or usual speed of the making-wire for a certain grade of stock, and means are provided for increasing the speed of the machine so as to cause the making-wire to move at a higher rate of speed than usual, being substantially equal to the speed of the rapidly-moving stock. To accomplish this result in a simple manner, the breast roll end of the paper-making wire is maintained at a substantial elevation above the level, thereby providing a continuous downwardly moving paper-making wire, and the declination thus given to the wire is such that the stock is caused to travel by gravity in the direction of the movement of the wire and substantially as fast as the wire moves. The declination of the paper-making wire may be adjustable or the speed of the wire may be variable, or both the declination and speed of the wire may be adjustable, in order that the velocity produced by gravity in the stock on the declining wire will approximately equal the speed of the wire. By this arrangement the speed of the machine may be increased to such an extent as to bring the speed of the making wire up to the maximum velocity of the rapidly-moving stock and a strong, even, and well-formed sheet produced which is more uniform than usual."

* * * * * *

"The elevation above the level at which the breast-roll end of the making-wire is maintained will vary according to the grade of stock; but in any event it will be substantial, so as to cause the stock to move rapidly by gravity. . . . For the purpose of increasing the speed of the machine to the maximum I main-

tain the breast-roll end of the making-wire at a high elevation above the level, so that the stock travels by gravity much faster than the making-wire ordinarily runs for a certain grade of stock, and I then increase the speed of the machine to such extent as to bring the rate of speed of the paper-making wire up to the speed of the rapidly-moving stock, and as a result the capacity of the machine is largely increased.

I find in practice that by providing a gravity-feed operating substantially as herein described, the stock runs smoothly and evenly without waving or rippling, and the fibres are thereby permitted to settle with great uniformity, as regards their distribution over the wire, so that the paper in addition to being well formed is very uniform. Furthermore, as the stock is moving with the paper-making wire instead of being moved by the wire, or essentially by the wire, the formation of the paper will begin at the start and will continue to the end of the travel of the stock with the wire. Furthermore, by making the sheet of paper uniform over all, less sulfite or strengthening material is required. Furthermore, as the stock carries less water when arriving at the suction-boxes, the amount of suction ordinarily required may be reduced, thereby reducing the friction due to the making-wire passing over the suction boxes and hence increasing the life of the wire." . . .

The claims of Eibel's patent now at issue in this suit are claims 1, 2, 3, 7, 8, and 12, as follows:

"1. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a substantial elevation above the level, whereby the stock is caused to travel by gravity, rapidly, in the direction of the movement of the wire, and at a speed

approximately equal to the speed of the wire, substantially as described.

"2. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a high elevation, whereby the stock is caused to travel by gravity faster than the normal speed of the wire for a certain grade of stock, and having means for increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly-moving stock, substantially as described.

"3. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, the breast-roll end of the wire being maintained at a substantial elevation above the level, whereby the stock is caused to travel by gravity, rapidly, in the direction of movement of the wire and at a speed approximately equal to the speed of the wire, substantially as described.

* * * * * *

"7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction-boxes supported at a corresponding declination, substantially as described.

"8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction-boxes arranged at different elevations, substantially as described.

* * * * * *

"12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated that the velocity of the stock down the declining wire, caused by gravity, is so related to the velocity of the wire in the same direction that waves and ripples on the stock are substantially

avoided and the fibres deposited with substantial uniformity on the wire, substantially as described."

The defenses are: First, invalidity of the patent by reason of anticipation in the prior art and by reason of indefiniteness in some of the claims. Second, non-infringement.

The patent has been before the Court of Appeals in the Second Circuit, Eibel Process Co. *v.* Remington-Martin Co. et al., 234 Fed. 264. The Court held the patent to be valid and infringed as to claims 1, 2 and 3.

1. The defendant contends that there has been anticipation in the prior patented arts; and also that there has been actual prior use of the Eibel invention. It introduces testimony tending to show that there were certain patents disclosing a substantial pitch, both for drainage purposes and for the same purposes to which Eibel applied the "gravity-feed" system.

In the Remington-Martin case, 234 Fed. 624, 631, the Court examined certain prior patents introduced by the defendant as proving anticipation. As to these patents, the Court said:

> "Six United States and ten foreign patents were received in evidence. All show means for effecting a slight adjustment of the breast-roll, and none amounts to more than an illustration of the drainage adjustment which Eibel fully understood and referred to in his patent. The patents demonstrate that skilled men prior to Eibel did not appreciate the possibility of raising the breast-roll end of the machine more than an inch or two, and that none of them had had the faintest conception of the principle of operation which characterized the Eibel invention."

The same patents are before me in this case. Upon examination of them, I find no reason to differ from the con-

clusion of the Court of Appeals in the Second Circuit. The defendant now refers to the Barrett & Horne patent, No. 691333. This is said to be an improvement on an earlier Barrett & Horne patent No. 634288, which was in evidence in the Remington-Martin case. The later patent refers to the former patent and says:

> "It is the object of our present invention to modify this type of machine by placing the adjusting device for the shake-frame above the same and out of reach of any moisture or water that might flow over on to the floor."

The purpose of the adjustment appears to be the same as in the earlier patent, namely: "to adapt the machine for pulp of different kinds or grades." In the earlier patent the method of so adapting the machine for pulp of different kinds is explained as follows:

> "In certain kinds of pulp, notably the wood-pulp which is now largely used in making paper, the water drains away very rapidly, so that the pulp may become nearly dry before it leaves the shake-frame, and thus not be properly laid when it reaches the rollers. This tendency may be obviated to a considerable extent by downwardly inclining the shake-frame toward the rollers, so that the water tends to travel along with the pulp and will not, therefore, drain out through the wire so rapidly. It is further desirable that the amount of inclination or slope should be variable, so as to adapt the machine for pulp of different kinds or grades."

It appears, then, that the reason for the slight pitch of the wire which these patents provide is to prevent the difficulty arising when certain kinds of pulp are used in which the water drains away rapidly. In the later pat-

ents, as in the earlier one, I find no claim of any novelty in respect to an effort toward adjustment, for the purpose which Eibel disclosed. The patents tend, rather, to illustrate adjustments well known to the whole art before Eibel, and referred to at lines 82 et seq. of his specification. They do not disclose that these adjustments are for the Eibel purpose of reducing the relative speed of stock and wire, giving the stock a gravity acceleration, and thus doing away with the waves, ripples and wrinkles caused by the difference of speed between the stock and the wire. There is no indication that the patents seek to increase the speed of production. I think this may also be said of the alleged prior use at Lisbon Falls. This relates to two machines of the Pejepscot Paper Company. There was a pitch of two inches used on these machines before the Eibel patent. This use was clearly for "carrying the water nearer to the suction box." Evidence was offered by the defendant tending to show a pitch of four inches or more; and that such pitch was used for purposes which might be held to be within the Eibel patent. After examining this testimony I find it insufficient to establish either the date or other substantial facts with reference to this alleged prior use. This is especially so in view of the well-known rule invoked by Judge Putnam of the Court of Appeals in this Circuit, in the Emerson and Norris Company case, 202 Fed. 747, 750. After a careful study of all the evidence offered by the defendant to prove anticipation, either in patents or by a prior use, I am led to the conclusion that no one of the prior inventors, or alleged users, disclose any of the inventive purpose of Eibel. No one shows any knowledge of any relation between the pitch of the wire and speed, or of the use of gravity to aid the other elements in well known use before Eibel. From a study of the proofs now before me, I see no reason to differ with the Court of Appeals in the Second Circuit in

its conclusion that no one before Eibel had any knowledge of his theory; and that the slight pitches of the prior art were used in most instances to bring stock to the "dandy roll" more quickly than when the horizontal wire was used.

It is true, of course, that a slight pitch of two inches causes some slight increase in the speed of the stock on the wire. Eibel's claims are limited to a substantial pitch; for it is only by such assistance of gravity that Eibel could acquire the speed which he sought. He appears to have been invoking this aid of gravity, in correlation with the conditions which he already found in the use of Fourdrinier machines; namely, "drag" and "head."

It is evident that the trivial pitches in the prior art were used for a wholly different purpose from that of Eibel. Those who used them are not shown by the proofs to have appreciated and observed the operative system which Eibel invoked. Their use was so inconsiderable in extent that any possible effect was apparently too small to be capable of observation. They would give no help to anyone seeking to obtain further speed in the use of the Fourdrinier paper machine; they would give no hint in regard to any practical purpose of conforming the speed of the stock to the speed of the wire. If, in using the pitch for drainage, some slight advantage was obtained in reference to equalizing the speed of the stock to that of the wire, it was clearly an unexpected and unappreciated result. And it is clear that such result is not sufficient to constitute infringement.

Tilghman v. *Proctor*, 102 U. S., 707, 711.

If there be any doubt as to patentable novelty, this doubt may well be resolved in favor of the patent, by its commercial utility. The proofs show that, when the Eibel process was first put in use at Rhinelander, the high pitch which Eibel had brought to the art was looked upon

as revolutionary. Up to that time the usual speed of Fourdrinier machines had seldom exceeded 450 feet per minute, although the whole art was seeking greater speed. It was said that the "fastest machines in the world" had arrived at a speed of about 500 feet per minute; but to attempt to get an increase of speed beyond this limit had met with failure; and where high speed had been tried it had been abandoned, because it was found that at higher speed there was great commotion on the wire, resulting in "wild" paper. After the Eibel idea got fairly before the public, it was at once adopted by substantially the whole art. As a result of using the high pitch, taught by Eibel, the proofs show that the paper machines have been able to increase their speed from 25 to 30 per cent., or even more; so that it is now the common practice to make news paper at a speed of 600 feet, or even 680 feet, per minute; and that it is not now known what the limit may be to speed. In *Loom Company* v. *Higgins*, 105 U.S. 580, 591, the Supreme Court found a new and useful result where a loom was made to produce 50 yards a day when it had never produced more than 40. The teaching of that case has now become common learning in courts accustomed to pass upon patents. Success makes the result seem simple; and it is quite usual to have witnesses say that the thing was easy, and did not involve any use of the inventive faculty. In the case before me, it does not appear to have occurred, either to the prior patentees, or to machine workers, before Eibel, that high speeds could be attained by using a high pitch. When the result was attained, however, the public was glad to profit by it. And the proofs show that the result of the Eibel invention has been a most extended commercial use of his process. This commercial utility and success may properly be invoked in favor of the patent.

The defendant contends that claims 1, 2 and 3 are void for indefiniteness.

In claim 1, Eibel has the breast-roll end of the paper making wire in the machine "maintained at a substantial elevation above the level, whereby the stock is caused to travel by gravity, rapidly, in the direction of the movement of the wire." Similar language is used in claims 2 and 3. The defendant says that the use of such words as "substantial elevation" and "rapidly" are so indefinite as to render the claims void. Eibel's inventive thought had for its object a process whereby the machine might be run at a much higher speed than heretofore. Eibel found the Fourdrinier machine with the wire running horizontally. He took the elements which were already in use and added to them a process whereby the breast-roll end of the wire is maintained at a sufficient elevation above the level to make the stock travel, by gravity, at great speed. It is apparent from the testimony of the experts that it was impossible to know in advance the exact speed which any particular pitch would cause; this lack of knowledge beforehand was due to the variations in the stock used, and to the varied use of the different elements then employed in operation; sometimes the depth of the "pond" back of the slices would be greater than at others. The "drag" or "friction" of the wire on the stock might be different at different times, other elements might vary. A sufficient pitch had to be given to cause a rapid gravity flow of the stock under all existing conditions. A pitch of two or three or four inches would not be enough. It must be found by practice what pitch of the wire would be enough to bring the speed of the stock up to the speed of the wire. The claims should not be pronounced void because they do not express in inches the amount of elevation required to achieve the result which Eibel had in mind. I think the

claims should not be held invalid by reason of indefiniteness.

2. Infringement. — The defendant says that its machines do not infringe the claims of the patent in suit; that Eibel's proposition was to give the wire such an elevation that gravity *alone*, due to the pitch of the wire, would cause the stock to attain the same speed as the wire at the point where the stock would lose its viscosity and settle down upon the wire in a thin sheet. The defendant urges that it has not given its wire such an elevation, and that, therefore, it does not infringe. In other words, the defendant contends that Eibel's invention contemplated that pitch *alone* should do all the work of bringing the stock from nothing up to an ultimate speed equal to that of the wire; that Eibel contemplated that there should be no "head" at all back of the slices, and that "drag" should be done away with altogether, as a factor in accelerating the speed of the stock; and that no machine comes within the Eibel inventive thought unless that part of the stock speed which is contributed by pitch is greater than that part of the stock speed which is due to the other two factors. The learned counsel for defendant urge that when Eibel speaks of a gravity machine, or of a "gravity-feed," he refers to the use of gravity, to the exclusion of all other elements; and that, when, in his claims, Eibel speaks of the stock traveling by gravity, he refers to the use of gravity without any help from other sources. It is to be noted that Eibel's one object was to arrange a process by which the machine could be run at a much higher speed than heretofore. With this in view, Eibel organized his machines at the Rhinelander Paper Company in such a way that they had a pitch of about fourteen inches and run at a speed between 500 and 600 feet per minute. To produce this result he used gravity. He used, also, the elements which he found at hand; namely, the "drag" and

the "head," due to the depth of the "pond" back of the "slice." His effort was to get speed; he did not wish to abolish or disregard any of the elements which helped him to get speed.

But, if the contention of the defendant is correct, he did not put his own invention into practical use at Rhinelander, or at any other place, for in practice he did not obtain his speed by gravity alone. In fact, the defendant's experts testify that the mode of operation set forth in the Eibel patent in suit has never been put in practical use by anybody; it was not used at Rhinelander; it was not used in the other mills; it is not embodied in the drawings of the patent.

I cannot sustain such contention. I cannot so construe the specification and claims of the patent. Eibel introduced a new speed-making factor. He proposed to bring the speed of the stock up to the speed of the wire; to use gravity to that end; but I cannot hold that he contemplated that gravity should be used to the exclusion of the other elements which were already in use. He found those elements at work; there is no reason why he should exclude them from helping along the work. The process invented by him begins to operate after the stock has entered upon the wire. His apparent attempt was to get rid of bubbles and wrinkles, before he got to the place on the machine where paper is formed. To do this, he allowed gravity to work with "drag" and with "head." He harnessed all the elements he could find. He brought gravity in with the other elements; and so brought the speed of the stock up to equality with that of the wire. By this means he achieved high speed and also freed the stock on the wire from waves and ripples.

The proofs show that the defendant has used a substantial pitch;—and not merely the trivial pitch employed for drainage adjustments; and that it has used this pitch in

order to call gravity into operation, as an accelerating factor, to speed the stock up to a speed equal to that of the wire. I think it must be held that the defendant infringes the principles of the Eibel patent.

The proof indicates that the defendant has used, in some machines, a pitch of twelve or fourteen inches. In these machines, it clearly infringes. Testimony tends to show that it has used a smaller pitch of about six inches in what is called a No. 2 Machine. In the present aspect of the case, I think it unnecessary to decide whether or not the use of the smaller pitch in the No. 2 Machine is or is not an infringement.

Coming to the details of infringement: It is evident from what I have already said that the defendant infringes claims 1, 2 and 3 of the patent. Claims 7 and 8 are machine claims, referring to that element of the machine which is found in claim 3, namely the declination of the paper-making wire from the breast-roll to the guide-roll, and including the suction boxes in such declination. The extent of the declination is not given in precise terms, but it must be "substantially as described"; that is, it must be a substantial declination. It seems to me clear from the evidence that the defendant infringes also claims 7 and 8.

Claim 12 specifies that the speed of the stock and wire shall be so adjusted that waves and ripples on the stock are substantially avoided, and the fibres deposited with substantial uniformity; this being a result obtained by the claims 1, 2 and 3. Claim 12 is a process claim. It clearly involves the principles of claim 1. I think the evidence in the record shows an infringement by the defendant of claim 12. My conclusion, then, is that claims 1, 2, 3, 7, 8 and 12 are valid and infringed. A decree may be entered for the plaintiff for an injunction and for an accounting.

The plaintiff recovers costs.

The plaintiff may present a draft decree on or before October 9, 1920. The defendant may present corrections, if any, on or before October 25, 1920. The decree is to be settled October 30, 1920, at ten o'clock, A. M.

UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FIRST CIRCUIT.

OCTOBER TERM, 1920.

No. 1504.

MINNESOTA & ONTARIO PAPER COMPANY,
DEFENDANT, APPELLANT,
v.
EIBEL PROCESS COMPANY,
PLAINTIFF, APPELLEE.

APPEAL FROM THE DISTRICT COURT OF THE UNITED STATES FOR THE DISTRICT OF MAINE.

BEFORE BINGHAM, JOHNSON AND ANDERSON, JJ.

OPINION OF THE COURT.

JUNE 29, 1921.

ANDERSON, J. The District Court held claims 1, 2, 3, 7, 8 and 12 of the Eibel patent, No. 845,224, dated February 26, 1907, valid and infringed. 267 Fed. 847. The patent is on its face for an "Improvement in Fourdrinier Machines."

For generations the Fourdrinier has been the best known and most commonly used paper-making machine. It consists, in its first section, of an endless wire sieve, passing over a series of rolls at a constant speed. At the wet or breast-roll end of this running wire sieve there is discharged from a flow-box through a slice a stream of paper-making stock, consisting of wood pulp, sometimes with added mineral matter, mingled with from 135 to 200 times

its weight in water. The stock has the appearance of diluted milk. The wire mesh over which the stock travels has also a sidewise shaking motion to assist in the proper felting and interlocking of the fibers. The stock is carried along on this wire about 29 or 30 feet, draining off its water as it goes, until it reaches the couch rolls at the farther end of the wire, where it is pressed into the form of a uniformly distributed wet pulp or web, strong enough to hold together. It is then carried through a series of pressing and drying rolls and calendars, which constitute the drying end of the machine. About 20 feet from the breast roll, are placed suction boxes in contact with the under surface of the wire, operating by means of a partial vacuum to assist in the extraction of excess water remaining in the pulp and to compact the sheet by atmospheric pressure.

The foregoing is but a meagre description of the first part of a large and complicated machine upon which paper stock goes in highly diluted liquid form, is subjected to draining, shaking, meshing, pressing and heating processes, until it emerges as a smooth fabric,— news-print.

These Fourdrinier machines are expensive, costing about $100,000 each. As a matter of economy, they run continuously, day and night. Speed — which means quantity — and quality of paper, have been for decades the constant quest of paper-makers. In operation it is manifest that, as the stock drains, meshes and settles upon the wire, it must at some point be brought to speed equality with the wire. It is agreed that this point of speed equality is, normally, about 9 or 10 feet from the breast-roll.

The evidence shows, and it is obvious, that if, as the bulk of the water drains out of the stock, there be too great difference between the speed of the wire and the speed of the stock, a commotion of ripples and waves will result which may, and frequently does, cause wrinkles and other

defects in the paper. Moreover, if the forming fabric breaks, because of too high speed or other cause, the machine has to be stopped and continuous and economical production is prevented.

The evidence also shows, and it is manifest, that the successful operation of such a machine involves constant study and adjustment of numerous factors; such as the speed of the wire, the weight of paper desired, the quality of the stock (described as quick or slow, accordingly as the fibers part with the water quickly or slowly, as well as containing a varying amount of water ranging from 135 to 200 times the weight of the fibrous matter), the amount of head in the flow-box, as well as the grade of the wire-carrier.

There are three factors, all or any two of which may be used, in any preferred relative proportions, to bring about the necessitated speed equality between the stock and the wire, 9 or 10 feet from the breast-roll:

(1) Initial speed due to the head in the flow-box from which the stock comes upon the wire. Heads in common use run from 2 to 10 inches. Obviously, the greater the head the greater the initial velocity of the stock.

(2) The wire itself may be pitched down-hill so as to give an increasing speed by gravity; it may be level; or it may be tipped the other way so as to require the stock to run uphill. These factors, described as two, are really only one,— head and down-hill pitch being nothing but gravity; or, as the plaintiff's expert put it, the lower the head the more pitch is required.

(3) The third factor is described as "the drag of the wire," meaning the acceleration between a lower initial speed at which the stock is assumed to start upon the wire, caused by the friction or adherence of the stock to the wire, in bringing the speed of the stock up to equality with the

movement of the wire, on which is must ride as a pulpy fabric before it reaches the couch roll.

The plaintiff's general contention is that before Eibel made in 1907 his alleged invention, Fourdrinier machines running faster than 450 to 500 feet a minute caused irregularity, or "wildness" in the paper, because at high speeds there was too great a difference between the stock speed and the wire speed to be overcome by the drag, resulting in carrying the under part of the liquid stock faster than the upper part, thus causing excessive and injurious waves and ripples. It is contended that Eibel conceived a notion described as "a brilliant discovery" of calling in gravity applied by pitching the wire, to supplement drag as a means of speeding up the stock on the wire, thus obtaining a better quality of paper, and also enabling the wire itself to be speeded up beyond what had hitherto been regarded as the normal speed, so as to get a larger output. Eibel applies his alleged invention by blocking up the breast end of the machine, or by raising the breast end of the wire by a worm screw, or by any other suitable method. The infringement charged against the defendant is that it is operating its machines with the breast end of the machines, or at any rate the breast end of the wires, raised 12 to 15 inches above the level.

The defendant contends that the patent involves no invention; that Eibel's adjustment of the machines differs merely in degree from practices shown in the prior art: and that if the patent can under any construction be held valid, the defendant does not infringe.

Turning now to the patent, which must be somewhat fully stated: It is termed, as noted above, "Improvement in Fourdrinier Machines." In the specification it is said:

"This invention relates to Fourdrinier machines, and has for its object to construct and arrange the machine whereby it may be run at a very much higher speed than

heretofore and produce a more uniform sheet of paper which is strong, even, and well formed. My invention is embodied, essentially, in the first part or element of the machine having the Fourdrinier wire or paper-making wire, and *consists in causing the stock to travel by gravity in the direction of movement of the making-wire and approximately as fast as the making-wire moves, thereby resulting in a 'gravity-feed' for the machine.* The stock may be and preferably is caused to travel more rapidly than the normal or usual speed of the making-wire for a certain grade of stock, and means are provided for increasing the speed of the machine so as to cause the making-wire to move at a higher rate of speed than usual, being substantially equal to the speed of the rapidly-moving stock. To accomplish this result in a simple manner, the breast-roll end of the paper-making wire is maintained at a substantial elevation above the level, thereby providing a continuous downwardly moving paper-making wire, *and the declination thus given to the wire is such that the stock is caused to travel by gravity in the direction of the movement of the wire and substantially as fast as the wire moves.* The declination of the paper-making wire may be adjustable or the speed of the wire may be variable, or both the declination and speed of the wire may be adjustable, in order that *the velocity produced by gravity in the stock on the declining wire will approximately equal the speed of the wire.* By this arrangement the speed of the machine may be increased to such an extent as to bring the speed of the making-wire up to the maximum velocity of the rapidly-moving stock and a strong, even, and well-formed sheet produced which is more uniform than usual."

The drawing in the patent shows the wire elevated at the breast-roll approximately 14 inches, by means of a screw; but the specification expressly says that any other suitable means may be employed for this purpose.

Eibel continues:

"The Fourdrinier wire has usually been arranged to move in a horizontal plane, although I am aware that means have been provided for adjusting the breast-roll end of the wire to different elevations, usually below the level, to provide for running with different grades of stock — as, for instance, with quick stock and slow stock; but so far as I am aware the making-wire has always had to perform the work of drawing along the stock, and as the wire moved much faster than the stock the stock waved or rippled badly near the breast-roll end of the wire, which gradually diminished until an equilibrium was established and a smooth, even, and glassy surface presented, and not until the waving or rippling ceased did the fibers lay down uniformly and produce a well-formed sheet of paper."

But he states:

"In accordance with my invention I operate entirely above the level *to cause the stock to travel by gravity at a velocity approximately equal to the speed of the making-wire,* which I believe to be a new principle of operation. The breast-roll end of the making-wire *a* is maintained at a substantial elevation above the level, so that the wire declines. *The declination of the wire is sufficient to enable the stock by gravity to move at a rapid rate of speed, which speed is substantially equal to the speed of the making-wire,* so that the waves or ripples are eliminated."

He adds that the pitch may be continuous from the breast-roll to the guide-roll, or only from the breast-roll to the suction-boxes, preferably the former. Also:

"The elevation above the level at which the breast-roll end of the making-wire is maintained will vary according to the grade of stock; but *in any event it will be substantial, so as to cause the stock to move rapidly by gravity.*"

"For the purpose of increasing the speed of the machine to the maximum I maintain the breast-roll end of the making-wire at a high elevation above the level, *so that the stock travels by gravity much faster than the making-wire ordinarily runs for a certain grade of stock, and I then increase the speed of the machine to such extent as to bring the rate of speed of the making wire up to the speed of the rapidly moving stock*, and as a result the capacity of the machine is largely increased. I find in practice that by providing a gravity-feed operating substantially as herein described the stock runs smoothly and evenly without waving or rippling, and the fibers are thereby permitted to settle with great uniformity as regards their distribution over the wire, so that the paper in addition to being well formed is very uniform. Furthermore, *as the stock is moving with the paper-making wire instead of being moved by the wire, or essentially by the wire*, the formation of the paper will begin at the start and will continue to the end of the travel of the stock with the wire. Furthermore, by making the sheet of paper uniform over all less sulfite or strengthening material is required. Furthermore, as the stock carries less water when arriving at the suction-boxes, the amount of suction ordinarily required may be reduced, thereby reducing the friction due to the making-wire passing over the suction-boxes, and hence increasing the life of the wire."

The claims in suit are as follows:

"1. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a substantial elevation above the level, *whereby the stock is caused to travel by gravity, rapidly, in the direction of movement of the wire, and at a speed approximately equal to the speed of the wire*, substantially as described.

"2. A Fourdrinier machine having the breast-roll end

of the paper-making wire maintained at a high elevation, *whereby the stock is caused to travel by gravity faster than the normal speed of the wire* for a certain grade of stock, and having means for increasing the speed of the machine *to cause the wire to travel at substantially the same rate of speed as the rapidly-moving stock, substantially as described.*

"3. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, the breast-roll end of the wire being maintained at a substantial elevation above the level, whereby the stock *is caused to travel by gravity, rapidly, in the direction of movement of the wire and at a speed approximately equal to the speed of the wire,* substantially as described."

"7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction-boxes supported at a corresponding declination, substantially as described.

"8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction-boxes arranged at different elevations, substantially as described."

"12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated that the velocity of the stock down the declining wire, caused by gravity, is so related to the velocity of the wire in the same direction that waves and ripples on the stock are substantially avoided and the fibers deposited with substantial uniformity on the wire, substantially as described."

No reference is made in the patent to head as a speed-producing factor. Gravity, due to pitch and not to head, and the drag of the wire, are the only speed-producing forces recognized by the patent, at any rate directly. In eighteen different places in the specification and twelve

claims, Eibel refers to gravity as the force causing the stock to move approximately or substantially as fast as the wire moves. We have italicized such references in the portions of the patent quoted above.

The parties are in sharp and irreconcilable conflict as to the construction to be put upon the claims in suit. The plaintiff construes claims 1, 2, 3 and 12 as process claims, and contends that the words "substantial elevation" in claims 1 and 3 and "high elevation" in claim 2 cover any elevation of the breast-roll of the paper-making wire appreciably greater than that shown in the prior art, contended to be any elevation exceeding 5, or at any rate 6, inches. Plaintiff's expert testifies that a 5-inch pitch would not necessarily be the Eibel invention, "but it might be on the border line"; that he hardly thinks a 4-inch pitch would involve the Eibel invention. It is therefore conceded by the plaintiff that the prior art shows pitches of 3 or 4 and perhaps 5 inches. Consequently, plaintiff contends that the words "substantial elevation" and "high elevation" in these claims cover all pitches an inch or more in excess of the pitches shown in the prior art.

The defendant contends that, so construed, the so-called process claims are void for indefiniteness and as differentiated from the prior art only by a mere change in degree. Also that the claims, farily construed, limit or define the words "substantial elevation" and "high elevation" by the later language of the claims which, construed with the specification, means that the pitch must be enough so that gravity alone will bring the stock up to the speed of the wire. It is difficult to read the patent otherwise. As already noted, the patent is silent as to head. As the uncontradicted evidence shows that pitch adequate to eliminate drag is, even with a 2-inch head, not less than 48 inches, and that the defendant's alleged infringement consists only in using a pitch not exceeding

15, or at most 18 inches, the defendant contends that if the patent as fairly construed can be held valid, there is no infringement.

Such pitches as 40 to 54 inches have never been used. It is not now claimed that Eibel discovered that such pitches are useful or that their use would be Eibel's invention. If, therefore, the patent describes such pitches, it describes something not claimed as an invention, as well as something not infringed. If Eibel did not mean such pitch as would practically eliminate drag, in eighteen places the language used requires a strained and unnatural construction.

The plaintiff — at any rate by implication — concedes that the first three claims which cover the essence of the alleged invention can be sustained only as process claims. It is noteworthy that no such word as "process" or "method" is found in these claims or in the specification. But it is not, and cannot be, contended that Eibel invented a new machine. As pointed out by Judge Warrington in the English decision holding the corresponding English patent invalid (*European Eibel Co., Ltd.* v. *Edward Lloyd, Ltd.*, Illustrated Official Journal (patents), June 21, 1911, pp. 349, 356):

"The patentee proposes no alteration in the machine itself; the machine remains identically what it was before. He does not produce a new machine; all he suggests is what he considers a novel and useful mode of employing the old machine to produce the same article."

The plaintiff does contend that claims 7 and 8, referring to adjusting the suction-boxes so as to correspond with the pitch or declination of the wire, are machine or machine improvement claims. But, apart from prior use, it is difficult to believe that such rearrangement of suction-boxes

as to enable them to perform their accustomed function of extracting water from the stock moving over the wire above, can be anything other than an ordinary mechanical adjustment. We cannot believe that claims 7 and 8 in and of themselves involve any invention. At any rate, prior use at the Northern Paper Company as early as 1904 effectually disposes of these claims.

Referring, then, to claims 1, 2, 3 and 12,— all of them deal with the old Fourdrinier machine so adjusted that the breast-roll end of the paper-making wire will have a "substantial elevation." The insertion of iron or wooden blocks under that end of the machine, or the raising of the wire by a worm screw, or by any other common device for lifting that part of the old machine,— is the only change required by the alleged invention. In a word, the plaintiff contends that the user of a Fourdrinier machine who blocks up the breast-roll end of the machine, say 5, 6 or more inches, is an infringer upon the Eibel patent.

There is obvious difficulty in construing these claims as process claims. They are not so phrased. It is elementary that the patentee can have nothing beyond what he has particularly pointed out and distinctly claimed, so that those familiar with the art may correctly draw the line between public right and private monopoly. *McClain* v. *Ortmayer*, 141 U. S. 419; *Merrill* v. *Yeoman*, 94 U. S. 568. Eibel says, in effect: "I claim a Fourdrinier machine adjusted at such a pitch, down-hill, that the stock will run as fast as the wire." He does not say "I claim a new process of making paper on a Fourdrinier machine, described as follows," etc.

We find no case which flatly holds that a patentee who, in his specification and claims, refers to a machine, and nowhere claims a patent on a process, has been held entitled to have his patent construed as covering a process.

In *American Tube Works* v. *Bridgewater Iron Co.*, 132

Fed. 16, an opinion in this court by Circuit Justice Holmes, sitting with Judges Putnam and Aldrich, the following is stated:

"The patent to Adams stated its claim thus: 'What I do claim (as a new article of manufacture) is a tube or cylinder cast out of copper and free from blow holes and other similar defects when produced as herein stated.' We assume that Adams had invented a new and valuable process, which it is unnecessary to describe, but by which he produced a much larger percentage of sound copper tubes than it had been possible to produce before. *But he took his patent for the product, and he must stand upon his claim as it was made.*" (Italics ours.)

See also *Boston Elastic Fabrics Co.* v. *East Hampton Rubber-Thread Co.*, 3 Fed. Cas. 1676; *Burr* v. *Duryee*, 1 Wall. 531.

The case of *Breuchaud* v. *Mutual Life Ins. Co.*, 166 Fed. 753, 756, cited by the plaintiff as authority for its proposition that, "It is immaterial whether they (the claims) are phrased in terms of process or of machine," falls far short of being an authority for so broad and far-reaching a proposition.

Claims 1 and 2 in the Breuchaud patent, held to be process claims, plainly describe a method or process for the construction of sub-bases for old walls. In claim 1 the word "method" is used and the method described. In claim 2 the phrase "while they are driving" was said by the court to indicate a process. Claims 3 and 4, which were for the product of the process, were held void.

We refer to the difficulty on this point in order to make it clear that we do not, by implication, adopt the plaintiff's rule of construction. We are not now prepared to hold that claims 1, 2, 3 and 12 of the Eibel patent do "particularly point out and distinctly claim" (Rev. Stat. sec. 4888) alleged new processes.

There is much reference in plaintiff's brief to "The Eibel principle." Of course there can be no valid patent on a mere "principle." *Burr* v. *Duryee*, 1 Wall. 531; Walker, Patents, 5th ed. §7.

But if we assume this first doubtful proposition determined in the plaintiff's favor, there are other difficulties in the way of sustaining the patent that we find insuperable.

On the plaintiff's construction of the first three vital claims it is necessary to construe the words "substantial elevation" in claims 1 and 3, and "high elevation" in claim 2, as so to avoid the otherwise fatal objection of indefiniteness. What do the words "substantial elevation" and "high elevation" mean?

Now, as already stated, the plaintiff admits that the prior art shows elevations of 4, and perhaps 5, inches in the breast-roll end. The plaintiff is, therefore, necessitated to contend that the words "substantial elevation" and "high elevation" mean something in appreciable excess of the prior art elevation. The result is that, in effect, the plaintiff claims that if the prior art shows pitches of 4 inches, then 5 inches is Eibel's invention; that if the prior art shows 5 inches, then 6 inches is Eibel's invention. Obviously, this construction puts upon the reader of the patent, in construing the words "substantial elevation" and "high elevation", the burden of knowing what pitches had been used in the prior art. Concededly a patent on a mere difference of degree in the use of a principle shown in the prior art is invalid. And so are all the authorities.

Smith v. *Nichols*, 21 Wall. 112, 22 L. Ed. 566; *Grant* v. *Walter*, 148 U. S. 547, 553, 37 L. Ed. 552; *Burt* v. *Evory*, 133 U. S. 349, 358, 33 L. Ed. 647; *Market Street Railway Co.* v. *Rowley*, 155 U. S. 621, 39 L. Ed. 284; *Fox* v. *Perkins*, 52 Fed. 205, 3 C. C. A. 32; *Galvin* v. *City of Grand Rapids*,

53 C. C. A. 165, 115 Fed. 511; *Eames* v. *Worcester Poly. Institute*, 123 Fed. 67.

We think it very clear that, adopting for the moment the plaintiff's own construction of these claims as covering a process and as covering any pitch in the Fourdrinier machine appreciably greater than the 4 or 5 inches shown in the prior art, the claims cover nothing but a difference in degree.

This conclusion will be made plainer if we illustrate the operation of gravity through the two different methods of pitch and head in producing speed on the wire. The evidence shows, and it is plain on elementary principles, that pitch and head are nothing but gravity applied to the liquid stock in two slightly different ways. The uncontradicted expert evidence shows that, ignoring friction, ". . . the speed of flow attained by water in running down hill is the same as the speed or velocity under which water will be discharged from an orifice under a hydraulic head equal to the vertical height of the hill."

A table based on data taken from an Engineer's Hand Book in common use and printed in defendant's brief will conveniently illustrate this aspect of the problem:

		Initial Speed	3″ Pitch	6″ Pitch	9″ Pitch	12″ Pitch	15″ Pitch
0	Head	00	138.6	195.6	240.6	276.6	308.4
3″	"	240.6	276.6	308.4	340.2	366.6	391.0
6″	"	340.2	366.6	391.0	417.0	438.0	459.0
8″	"	391.0	417.0	438.6	459.0	481.8	500.4
10″	"	438.6	459.0	481.8	500.4	518.4	538.8

The figures in the first column of this table indicate the initial speed at which the liquid stock will enter upon the wire under the various designated heads in the flow-box. The figures in the other columns show the speed that the stock will attain at a point 9 or 10 feet from the flow-box

where, normally, there should be equality of speed between the wire and the stock.

Although the plaintiff's patent makes no reference to head as a speed-producing or gravity-using factor, we assume, as plaintiff's counsel contends, that the machine would hardly be expected to operate without any head at all.

Plaintiff contends that heads from 2 to 8 inches are to be regarded as normal. Many illustrations given by the plaintiff's expert are based on a head of 2¼ inches. Compare also Judge Mayer's opinion in 234 Fed. 628. On the plaintiff's proposition, therefore, a 3-inch head could not be regarded as abnormal.

Referring, then, to the table, it will be observed that, assuming the stock projected upon the wire from a 3-inch head, the initial speed will be 240.6 feet per minute; that the speed acquired in traversing one-third of the distance from the flow-box towards the guide-roll will, through the effect of different pitches and a 3-inch head, be as follows:

3″ pitch	6″ pitch	9″ pitch	12″ pitch	15″ pitch
276.6	308.4	340.2	366.6	391

Further analyzing, it appears that the 3-inch pitch, admitted to be prior art, adds to the initial speed produced by a 3-inch head 36 feet; that a 6-inch pitch, claimed to embody Eibel's invention, gives at the same point on the wire a further additional speed of only 31.8 feet; that the increased pitch from 6 to 9 inches increases the speed from 308.4 feet to 340.2 feet or 31.8 feet, and so on.

Now, in the typical case of alleged infringement, the wire on the defendant's machine was said to be moving at a rate of 585 feet per minute. With a machine so operated and assuming a 3-inch head and a 3-inch pitch, both prior art, the speed induced by gravity from both head and pitch would be 276.6 feet, leaving to be made up by the

drag of the wire 308.4 feet. But if, instead of a 3-inch pitch a 6-inch pitch be used (an alleged infringement) with the same head, gravity from such head and such pitch would produce a speed of 308.4, leaving to be made up by the drag of the wire 276.6. The contention then is, that, by increasing pitch-induced-gravity-speed by 31.8 feet, the plaintiff's patent monopoly is invaded. Otherwise stated, reducing the speed induced by the wire from 308.4 feet to 276.6 feet involves infringement.

Other interesting facts appear from this table. For instance, the initial speed of a 6-inch head upon a level wire, 340.2 feet (prior art), is exactly the same as the speed produced one-third of the way down the wire by a 3-inch head, plus a 9-inch pitch, alleged to infringe.

Again, an 8-inch head with a 3-inch pitch (prior art) gives the same result one-third of the way down the wire (417 feet) as a 6-inch head with a 9-inch pitch, claimed to be Eibel's invention.

Again, a 6-inch head with a 3-inch pitch, admittedly prior art, gives the same speed (366.6 feet) one-third of the way down the wire as a 3-inch head with a 12-inch pitch, claimed to embody Eibel's invention.

It will be observed that these equivalent results arise from the fact that 1 inch of head is equal to 3 inches of pitch, because only one-third of the pitch is really operative, as equality of speed between the wire and the stock is attained when the stock has passed only one-third the distance down the wire.

These comparisons sufficiently illustrate in figures the interchangeability of head and pitch as means of using gravity as a speed-producer. The record shows instances of actual experience in using decreased pitch with increased head resulting in equal or greater operating speeds. The plaintiff's expert testified that, so far as speed equality is concerned, the same results can be secured from either

head or pitch. And it was speed that Eibel was chiefly seeking. Judge Hale puts it:

"It is to be noted that Eibel's one object was to arrange a process by which the machine could be run at a much higher speed than heretofore." 267 Fed. 855.

But Eibel claims gravity as a speed-producer only when applied through pitch.

For present purposes, the computations in this table, which were elaborately illustrated by charts put in evidence through the defendant's expert, are undisputed. The differences in the methods used by the plaintiff's and the defendant's experts in applying the tables found in engineers' books of recognized authority are negligible. It follows irrefutably that, for most purposes now under discussion, head and pitch are interchangeable methods of applying the same force, viz: gravity as a speed-producer on the liquid stock upon the wire screen. It also follows, and is admitted by the plaintiff, that all of the pitches used by the defendant or by the licensees under the plaintiff's patent fell far short of eliminating drag as a speed-producing factor. Indeed, in the uses complained of by the plaintiff as infringing, drag remains a force nearly equal to, if not greater than, gravity due to pitch as a speed-producer.

While there are trifling conflicts in the evidence as to the adjustment and operation of the defendant's alleged infringing machines, the present point may be sufficiently illustrated by assuming that these machines were adjusted and operated in accordance with the plaintiff's testimony, with a 7-inch head, a 14 to 15-inch pitch; that the speed of the wire was 550 feet per minute; that the speed equality between the wire and stock was reached at the normal point 9–10 feet from the slice. So operated, the expert testimony shows the following results:

Total velocity of wire,	550 feet
Velocity of stock due to head,	350 "
Additional velocity due to pitch,	130 "
Balance of velocity due to drag,	70 "
Percentage of total velocity due to pitch, about	24
Percentage of velocity due to head,	63
Percentage of velocity due to drag,	13

If we consider defendant's machines as operated according to the defendant's testimony, at a speed of 585 feet, with 6-inch head and a pitch of 13½ inches, we get the following:

Velocity of wire,	585 feet
Velocity due to head,	330 "
Additional velocity due to pitch,	118 "
Balance of velocity due to drag of wire,	137 "
Percentage of total velocity due to pitch, about	20+
Percentage of velocity due to head,	56.6
Percentage of velocity due to drag,	23+

On this showing, even if the patent is valid, there is no infringement, except on the theory that the patent covers any substantial use of pitch to decrease the drag on the wire. If the patent means, as the Court of Appeals for the Second Circuit apparently held in the Remington-Martin case, 234 Fed. 624, that pitch adequate to bring the stock to speed equality is Eibel, there is no infringement. It would take a 48-inch pitch with a 2-inch head to relieve the wire of all drag. Even if the patent means that pitch must be the predominating force, there is no infringement; the defendant's predominating force is head.

The question of the amount of pitch covered by the Eibel patent is no mere academic problem. It is vital, and of money importance in this litigation. No decree for an accounting adequate to guide a master can be framed without deciding whether a 6-inch pitch is Eibel's

or the public's. After the filing of the bill on January 1, 1917, defendant reduced the pitch on its No. 2 machine from 14 to 16 inches to 6 or 6½ inches, and has so operated it during most of these four intervening years. Judge Hale, at the suggestion of plaintiff's counsel, did not decide whether or not the use of the smaller pitch in the No. 2 machine is or is not an infringement. 267 Fed. 855. But it must be determined in this case whether such use is an infringement,—to be paid for,—or the use of a common right. Plaintiff's contention that this pitch "is fairly close to the border line" and that the defendant "could have avoided any possibility of infringement by putting the wire flat" is unsound. Defendant was not required to avoid mere possibilities of infringement; it was entitled to all uses of its own machine not particularly pointed out and distinctly claimed in Eibel's patent. It will not do to assert, as plaintiff does, that 12-inch pitches are substantial and that 3 or 4-inch pitches (prior art) are negligible, leaving intervening pitches in limbo; a line must be drawn available practically, if not mathematically. This case is thus plainly distinguished from such cases as *Vacuum Cleaner Co.* v. *A. Rot. Valve Co.*, 227 Fed. 998, and 239 Fed. 544, and *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403, and other cases cited by plaintiff on the question of indefiniteness; in all those cases a practically definite limit was stated. In the Eibel patent we find no such limit.

The position learned counsel for the plaintiff are forced to take on this point, but illustrates in striking form the otherwise perfectly clear proposition that the Eibel patent is nothing but an attempt to monopolize a difference in degree; that it is only a claim of an improvement in the method of adjusting and operating the machine so indefinite that its own proponents cannot state its limit.

The defendant's experiment in operating this No. 2 machine with the pitch reduced from 14 or 16 inches to

6 or 6½ inches further illustrates the fact that the whole problem is not only one of degree, but of constant adjustment of the operating forces in the machine to different qualities of stock. It appears that this No. 2 machine, operated for a long period with a 6-inch pitch, has produced substantially as much paper, of a stronger fabric, and with less operating trouble, than its duplicate No. 1 machine with about a 13½-inch pitch. The evidence does indicate that the paper produced on the No. 2 machine looks a little "wilder"; but, tested by the tests alleged to be more important, it is contended to be at least as good paper as that produced on the No. 1 machine. Both machines were operated with substantially the same head, although at times the head of the No. 2 machine is said to have been a little higher.

In the light of this evidence, we find it impossible to hold that the difference between a 6-inch pitch and a 14 to 16-inch pitch causes,—other operating conditions being perhaps slightly varied,—the production of anything other than a slight difference in the look or quality of the paper. At any rate, it does not clearly appear that the additional pitch of 6 or 7 inches, contended by the plaintiff to be a substantial pitch, is an important, or even material, factor in enabling the machine to be operated at a greater speed or with the production of a superior quality of paper.

But whether a pitch of 14 inches does or does not produce more or better paper than a pitch of 6 inches, we think it clear that paper-makers are entitled to interchange pitch with head or with drag, and to vary pitch or head in accordance with such judgment as, dealing with any quality of stock or any capacity of machine, they form, through the experimental processes constantly used by operators, in so adjusting their machinery as to produce the largest amount and the highest quality of paper.

We have not found it necessary to review in detail the

great mass of evidence concerning prior uses, for, in the view we take of the case, the plaintiff's own admissions as to the nature and extent of 4 or 5 inch prior uses conclude the point in the defendant's favor.

Plaintiff's expert testifies that he hardly thinks "that 4 inches could be considered as a substantial pitch. *Q.* Why not? *A.* Because Eibel in his specification attempts to differentiate the pitch he has in mind from what had been previously used when he specified that it is to be substantial."

We cannot accept the theory underlying this testimony. It amounts to saying that a 5-inch pitch is not "substantial" merely because the witness had discovered that 4-inch pitches had been in common use before Eibel. But it is plain that the difference between no pitch and a 4-inch pitch is as great as the difference between a 4-inch pitch and an 8-inch pitch.

The plaintiff suggests, not apparently with much confidence, that this court ought to follow the decision of the Court of Appeals for the Second Circuit in the *Remington-Martin case*, 234 Fed. 624. We recognize fully the great weight which attaches to a decision by that learned court, and the importance of the principle that there ought to not to be conflicting decisions by different Courts of Appeal relative to the validity of the same patent. Nevertheless, the record before us is so different from that which was before the court in the Second Circuit that we do not think that we can properly follow that decision. It is our duty to decide the issues of law and fact as presented by this record. There is before us a large mass of convincing evidence as to prior use which was not in the Remington-Martin suit. We also have the assistance of elaborate expert testimony, illuminating some vital aspects of the problem, not put before that court. The defendant produced no experts in the Remington-Martin case. The

court was therefore left to accept the theories of plaintiff's expert.

We must limit ourselves to generalizations; an elaborate and detailed comparison of the two records would unduly prolong a discussion already sufficiently extended. It may, however, be appropriately noted that the defendant contends, not without plausibility, that the decision of the Court of Appeals for the Second Circuit, construed in connection with the record now before this court, makes that decision an authority for the defendant and not for the plaintiff.

It seems to be clear from Judge Mayer's opinion, 234 Fed. 624, that infringement was not contested in that court. The defendant in that court apparently relied upon the finding as to prior use by Judge Ray in the District Court, 226 Fed. 772, as follows:

"In short, I find from the testimony, which is not impeached, or discredited, or really contradicted, that everything this defendant is doing was done, and well-known and understood with many paper-makers, before Eibel's alleged date of invention."

The defendant now contends that the conclusion of the court above, reversing Judge Ray, is grounded on a misapprehension as to the date concerning which one or more of the defendant's witnesses was testifying as to paper-making conditions. However that may be, it is clear that there is nowhere in the opinion of Judge Mayer any discussion of the importance of drawing a sharp line between the degrees of pitch shown in the prior art and that which is alleged to be covered by the Eibel invention. On the contrary, that court says:

"The pitch of the wire and the wire speed must be so correlated that gravity *will accelerate the stock to speed equality with the wire.*" (Italics ours.)

This language construed in connection with the context shows that the court was referring to speed equality due to pitch and not to head. The statement, therefore, is at least not inconsistent with the defendant's contention that that court construed the claims as calling for an amount of pitch which would eliminate drag. If such be the meaning of that opinion, then, as the evidence before us shows conclusively that none of the pitches used by either plaintiff or defendant even approximate an elimination of drag as a speed-producing force, it becomes apparent that the view of that court is, on the essence of the problem, not inconsistent with the conclusion to which we have come.

The fact that Judge Ray, on a record dealing much less adequately with prior use than does the record before us, reached the same conclusion that we have reached on that point, is not without significance.

Our general views as to the indefiniteness of the claims are also accordant with those expressed by the English court. (*European Eibel Co.* v. *Lloyd*, The Illustrated Official Journal, vol. XXVIII, June 21, 1911.)

It is thus apparent that prior decisions, fairly analyzed and construed in the light of the record before us, offer no support to the plaintiff's contention. If they make either way, they make for the defendant.

Again, the plaintiff urges here the consideration given great weight in the Remington-Martin case, as well as by the District Court in this case, the alleged commercial success of the Eibel patent.

It is contended that Eibel's invention was at once adopted by substantially the whole art; that, using it, Fourdrinier machines have been able to increase their speed from 25% to 30%; that at the time of the trial of this case machines licensed under the Eibel patent were producing

daily about 3,400 tons, or substantially two-thirds of all the news print manufactured in the country.

We recognize, of course, the importance of practical commercial success in cases in which that principle may be properly invoked. It has been termed a "hazardous rule." *Nat. Sweeper Co.* v. *Bissell etc. Co.*, 249 Fed. 196; *Nat. Machine Corp.* v. *Benthall Co.*, 241 Fed. 72; *Harvey Hubbell, Inc.* v. *Gen. Elec. Co.*, 267 Fed. 564. It is no safe criterion of patentable novelty. *McClain* v. *Ortmayer*, 141 U. S. 419.

But the plaintiff has, perhaps not unnaturally, very much exaggerated this aspect of the record. It appears that of the licensees producing 3,400 tons a day, five of the largest, having a daily production of about 2,200 tons a day, are stockholders in the plaintiff company. It is obvious that to the extent that they are such stockholders their royalties are but payments to themselves. It is also clear that with the prestige which would result from the ownership and use of this patent by five leading paper concerns, commercial success with other manufacturers would be almost assured. Compare *Harvey Hubbell Inc.* v. *Gen. Elec. Co.*, *supra*. On this showing, which we infer was not before the court in the Remington-Martin case, no very great weight can be attached to the extent of the commercial use attained.

As to plaintiff's contention that Eibel's invention has increased the average speed of Fourdrinier machines 25 per cent to 30 per cent, we think this claim is not borne out on fair analysis of the whole record. Undoubtedly, since 1907 there has been a considerable increase in the average speed attained by Fourdrinier machines. The record as a whole warrants the contention that some part of that increase is due to the adoption of increased pitch, and that Eibel's disclosure of the advantages of increased pitches has had some practical and beneficial effect in the art of

paper making. But pitch is only one factor leading to this result. The fair inference from the record is that increased heads have also become common during the same period; that the machinery manufacturers are putting out heavier machines capable of standing higher power and increased speed; that careful study has been made of the quality of the stock and improvements made in adapting the quality of the stock to more rapid movement. In a word, the art has progressed. An increased pitch—the factor stressed by Eibel—is only one of the large number of factors tending to increased output, without serious impairment of quality. Paper makers must always struggle with variable elements; they must have freedom in adjusting their machines as skill and experience direct.

The plaintiff seeks to avoid the effect of the admitted prior use of pitches, which we must and do find to have been substantial, by contending that such pitches were adopted for drainage purposes only; that they were applied in ignorance of the alleged new principle discovered by Eibel. So contending, plaintiff's argument falls little short of claiming an absolute monopoly for Eibel of the use of gravity through pitch. But long before Eibel people knew that water would run down-hill and that the steeper the hill the faster the water would run. Moreover, drainage depends in part upon speed, and paper makers must have observed the relation, whether running the stock uphill or down-hill.

The plaintiff invokes the doctrine that accidental and unappreciated results and functions in prior uses are not anticipation, citing as the leading case on this point *Tilghman* v. *Proctor*, 102 U. S. 707, 711. Other cases cited are: *Tannage Patent Co.* v. *Donallan*, 93 Fed. 811; *Hillard* v. *Fisher Book Typewriter Co.*, 159 Fed. 439, 441; *Pittsburgh*

Reduction Co. v. *Cowles Electric Co.*, 55 Fed. 301, 307; *Wickelman* v. *A. B. Dick Co.*, 88 Fed. 264, 266; *Anthracite Separator Co.* v. *Pollock*, 175 Fed. 108, 111; *Taylor Burner Co.* v. *Diamond*, 72 Fed. 182, 185; *Byerley* v. *Barber Asphalt Paving Co.*, 230 Fed. 995, 997; *German-American Filter Co.* v. *Erdrich*, 98 Fed. 300; *Pittsburgh etc. Co.* v. *Seaman Sleeth Co.*, 248 Fed. 705, 709.

Accepting fully the doctrine, we think it is not applicable to the situation here disclosed. Plaintiff's own expert admits that "the effect of gravity was always there regardless of how small the pitch was." Compare *Brown* v. *Piper*, 91 U. S. 37, 41; *Westinghouse* v. *Boyden Power Brake Co.*, 170 U. S. 537, 555; *Risdon Iron Works* v. *Medart*, 158 U. S. 68.

It is incredible that a skillful operator of one of these great machines would have used a 3 or 4-inch pitch, with or without a substantial head, without paying some attention to the increased speed of the stock thereby induced. We agree with the contention of defendant's counsel that intelligent men in charge of such a machine could not operate it without discovering that commotion, ripples, and "wildness" in the paper would result if the wire travelled at a speed relatively much faster than the speed attained by the stock through head and pitch, one or both. But the direct and affirmative evidence shows that there was prior appreciation of the principle which Eibel now claims as his own discovery.

Patentees frequently obtain advantages in their patents which they did not discover. The principle applies to prior art uses. Compare *Scaffolding Co.* v. *Chain Belt Co.*, 254 U. S. 32, 37, where Mr. Justice McKenna said:

"We yield to the assertion of counsel that he (the patentee of the patent in suit) cannot be deprived of an advantage because he did not discern it, but the same concession must be given to Murray (a prior patentee). He

(Murray) was entitled to all of the benefit that he claimed for his device, *or that can be given to it by formal changes.*" (Italics ours.)

See also *Ansonia Brass & Copper Co.* v. *Electrical Supply Co.*, 144 U. S. 11; *Penn. R. R.* v. *Truck Co.*, 110 U. S. 490; *Blake* v. *San Francisco*, 113 U. S. 679.

It is true that to change the pitch of the machine was a somewhat troublesome and cumbrous undertaking,—such that an operator would not as matter of common and daily occurrence experiment with varying pitches; but it is also true, as pointed out above, that head was, for most purposes sought to be attained by the alleged Eibel invention, the equivalent of pitch; and that the record shows that operators were frequently experimenting with different heads. They must, therefore, have observed the action of the stock on the wire at different rates of gravity-inducer speed.

Even if, as the plaintiff contends, gravity applied through pitch gives a smoother and more even movement, and thus produces a better quality of paper, than when applied by head, yet, so far as relative velocity with the movement of the wire is concerned, the results would be the same. At most, the distinction between a head-induced speed and a pitch-induced speed was one of slight degree in the amount of commotion arising in the flowing and draining stock.

Besides, as already sufficiently indicated, Eibel does not claim a patent on the distinction between pitch-induced speed and head-induced speed. He ignores the existence of head-induced speed.

Summarizing our conclusions: If we construe the language of the patent according to its natural import as claiming pitch sufficient to eliminate drag, there was no useful invention, and no infringement even if there was invention; if we construe the claims as plaintiff would have

them construed, they cover merely a degree, and are void for indefiniteness.

The result is that the decree below must be reversed, the money paid the plaintiff, *pendente lite*, must be repaid, and the bill dismissed with costs to the defendant in this court.

It is ordered that the money paid by the appellant to the appellee pendente lite under order of this court of May 28, 1917, be repaid by the appellee to the appellant; the decree of the District Court is reversed, and the case is remanded to that court with directions to enter a decree dismissing the bill with costs; and the appellant recovers its costs of appeal from both the interlocutory and the final decrees.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1922.

No. 178.

EIBEL PROCESS COMPANY, PETITIONER-PLAINTIFF,

vs.

MINNESOTA & ONTARIO PAPER COMPANY, RESPONDENT-DEFENDANT.

Respondent's Reply to Petitioner's Reply Memorandum.

When this case was called for argument on Friday, January 5th, petitioner's counsel asked permission to file a reply brief, a copy of which had, a few minutes before, been handed to counsel for respondent. We stated to the court at that time that we should like the opportunity of looking over this brief, and if we thought that we ought to make any rejoinder, we would ask permission of the court to do so when the argument was resumed on Monday, January 8th. We desire to make a few suggestions in reference to some of the points presented by petitioner in this reply brief.

Statement in Defendant's Brief Respecting Aldrich's Testimony.

We see no occasion to make any changes, either in the quotations we have made from the testimony of plaintiff's expert, Aldrich, or in our comments upon such

testimony. The statements of Aldrich quoted in our brief (pp. 4 and 5) are all found in his original deposition (Rec., pp. 11-71) given before defendant had introduced testimony showing the common use in many mills of 3, 4, 5, and, as some witnesses stated, 6-inch pitches, coupled with a suitable head, resulting in an acceleration of the stock so as to approximate the speed of the wire, and enabling the making of paper regularly at speeds of from 530 to 560 feet per minute. This testimony of Aldrich was also given before there had been any analysis of the operation of defendant's machines and machines of the prior art, showing conclusively that defendant's machines, like the prior art machines, use head of stock in the flow box and drag of the wire as the predominating factors in bringing the speed of the stock to the speed of the wire, and using pitch of the wire only as a minor factor for this purpose.

After these facts were shown conclusively, Aldrich was recalled in rebuttal, and he then sought to save the case for plaintiff by giving the testimony in the record (pp. 119-158), portions of which are quoted in plaintiff's reply memorandum (pp. 3 and 4). Aldrich knew when giving this rebuttal testimony of the pitches used by the Bayless, Kimberly-Clark, Lisbon Falls and other mills, as well as by users of the Bagley & Sewall machines. He also knew of the expert analysis, by defendant's witnesses, of the operation of defendant's machines, and the machines of the prior art, and he then sought, by this rebuttal testimony, to escape from the admissions he had made in his original deposition, and to differentiate the operation of defendant's machines from those of the prior art, and to give a new interpretation to the specification and claims of the Eibel patent.

Again it is said upon p. 2 of the reply memorandum that Aldrich "emphasized repeatedly the complete difference between the purpose, theory and result of the

prior art drainage adjustments and those of Eibel's pitch," etc.

But Aldrich concedes in his original testimony that there is a necessary relation between speed and drainage for he says, referring to what he claims are "other important advantages" besides the increase in speed which Eibel secures, "the drainage of the stock is better because it is more uniform and accompanied by less disturbance by the formation of the sheet" (Rec., p. 27).

It necessarily follows that if giving a pitch to the wire for the purpose of increasing the speed results in better drainage, the converse must be true that giving a pitch to the wire to secure better drainage must increase the speed, exactly as stated by defendant's expert Livermore:

> "Of course, whatever effect the adjustment will produce will be just the same whether an operator had that particular effect in mind in making the adjustment" (Rec., p. 994).

It is impossible in a machine of this kind to pitch the wire, so as to get a better drainage effect, without accelerating the stock and lessening the difference between speed of stock and speed of wire, whenever the stock enters upon the wire at a speed less than the speed of the wire; but counsel claim this is not true in reference to the Bayless-Austin machines where they erroneously claim the stock entered upon the wire at an initial speed greater than the speed of the wire, as we hereinafter point out.

As to the statement that we have wrongly attributed to Aldrich the view that in an Eibel installation there must be either no head at all or else a very low head, we submit that this is the practical effect of the Aldrich original deposition to portions of which we have re-

ferred. We also refer to the following statement quoted from page 16 of the Record.

> "If the head in the flow box is, for example, two and a quarter inches, the speed with which the stock at the bottom of the stream will flow to the wire will be substantially 200 feet per minute. Various mechanical difficulties, which need not be stated here in detail, limit the amount of head which can conveniently be carried in the ordinary Fourdrinier machine, and so limit the initial velocity which can be given to the stock."

If there were any doubt about Eibel's idea of using a very low head it is dispelled by his second patent, No. 851,227, a copy of which is in the Record (pp. 1039-1041) applied for the second day after the patent in suit issued and in which he states that the paper making wire "is downwardly inclined according to my patent No. 845,224, dated February 26, 1907." In the specification of this patent it is said "It is not herein intended that, the stock shall accumulate in the stock-reservoir to produce a head," etc. (Pat. Spec., p. 2, lines 44-46). Eibel in this second patent specifically describes means to be used with the pitched wire of his first patent for getting the stock on to the wire without the use of a head.

The Eibel patent in suit makes no mention of any head and the only means it describes or shows for the "travel by gravity" of the stock is the inclination of the wire. Its drawing shows no flow box or slice.

It is true that Aldrich in testifying in September, 1917, more than ten years after the date of the Eibel patent, states that a five or six inch head was generally used *at that time* for news print machines (Rec., p. 47).

Referring to the statements on page 5 of plaintiff's reply memorandum, we think the testimony of Mr.

Aldrich makes it clear that pitches approximating 5 inches were old prior to Eibel. If not, the concession in plaintiff's brief (p. 174) that "defendant and everyone else is perfectly free as far as the Eibel patent is concerned to run like the Lisbon Falls machine with a 3 or 4 inch pitch," is sufficient to show that the 4-inch pitch is old, and not within the Eibel patent, and as Dickinson, with the Lisbon Falls machines, is now getting a speed of 530 feet per minute, and has done so for more than twenty years, and has, by adopting this pitch, got rid of cross waves in his sheet, it is certain that he is not using this pitch, which is conceded to be open to the public, for drainage purposes, but is using it for increasing the speed of his wire, just as Mr. Justice Warrington, in the English Eibel case, found that paper makers, prior to Eibel, were using a pitch of 4 9-16 inches (substantially the same as Dickinson's) for the purpose of increasing the speed of their machines from 300 to 450 per minute, while continuing to make good paper.

Defendant's Alleged Misuse of Figures.

It is said that we are disengenuous in making a comparison of the acceleration of stock on the wire with a three inch and a five inch pitch (26 feet), because "the figures named are what would be produced by pitches or 3 and 5 inches respectively with zero head." We were not disengenuous in making this comparison for the difference in acceleration due to a 5-inch pitch (said to be Eibel), over the acceleration due to a 3-inch pitch (prior art) when both are used with a 6-inch head is shown by the same table (Defendant's brief, p. 21) to be less than 26 feet per minute, and in fact less than 20 feet per minute.

Moreover, we have printed the table on page 21 of our brief which gives the figures for the exact acceleration of speed of stock with no initial head and with var-

ous initial heads and pitches. This table is quoted in the opinion of the Circuit Court of Appeals in this case (Rec., p. 199) and its accuracy has never been questioned.

On page 8 of the reply memorandum, comparison is made between the acceleration arising from the use of a 3-inch pitch with a 6-inch head—26 feet—and the acceleration that would be obtained—130 feet—with defendant's machines, if they were operated as stated in the affidavit of plaintiff's witness Gray (Rec., p. 31). The difference between a 26-foot acceleration of stock by pitch and a 130-foot acceleration by pitch when each is combined with the proper amount of head to cause the speed of the stock to approximate the speed of the wire is a mere difference in degree. This is clear in the light of the testimony referred to by the Court of Appeals in this case when it said:

> "The plaintiff's expert testified that, so far as speed equality is concerned, the same results can be secured from either head or pitch" (Rec., p. 200; Aldrich, Rec., p. 45).

This same witness testified:

> "XQ. 67. What does the head have to do with the Eibel invention?
>
> "A. The lower the head the more pitch is required.
>
> "XQ. 68. How small a pitch do you think might be used on machines of the kind you were considering if a sufficiently large head were employed?
>
> "A. No pitch at all (Rec., p. 45)."

The comparison of the accelerating effect of the pitch used by defendant with the accelerating effect of that used in prior art machines should be made between such machines as actually operated taking the effect of the head used into account and showing the results on a

percentage basis. Such a comparison between defendant's machines, both as originally operated with a 13½-inch pitch, and as its No. 2 machine has been operated with a 6-inch pitch, and the prior art Lisbon Falls machines conceded in defendant's brief to be outside the Eibel patent is as follows:

Defendant's Machines With 13½-Inch Pitch.

Initial Velocity Due to Head (Gravity) 330 feet=56.5%
Acceleration Due to Drag of Wire.....137 feet=23.4%
Velocity Due to Pitch (Gravity).....118 feet=20.1%

Total Wire Speed 585 feet.
Total Paper Speed 620 feet.

Defendant's No. 2 Machine With 6-Inch Pitch.

Initial Velocity Due to Head (Gravity) 330 feet=56.5%
Acceleration Due to Drag of Wire.....190 feet=42.4%
Velocity Due to Pitch (Gravity)..... 65 feet=11.1%

Total Wire Speed 585 feet.
Total Paper Speed 620 feet.

Lisbon Falls Machines With 4-Inch Pitch.

Initial Velocity Due to Head (Gravity) 325 feet=66.3%
Acceleration Due to Drag of Wire..... 99 feet=20.2%
Velocity Due to Pitch (Gravity)..... 66 feet=13.5%

Total Wire Speed 489 feet.
Total Paper Speed 530 feet.

Plaintiff's counsel say in their reply memorandum (pp. 8, 9, and 10) that the figures given in the diagram No. 2 of defendant's expert, Carter, based on the *estimate* of plaintiff's witnesses as to the wire speed of defendant's machines should be used in comparing the operation of defendant's machines with the operation of machines of the prior art. These figures printed on

page 8 of plaintiff's reply memorandum, when carried out in percentages, show as follows for the operation of defendant's machines with a 13½-inch pitch:

Initial Velocity Due to Head (Gravity) 350 feet=62.6%
Acceleration Due to Drag of Wire..... 70 feet=12.7%
Velocity Due to Pitch (Gravity).....130 feet=33.7%

Total Wire Speed 550 feet.
Total Paper Speed 620 feet.

(Defendant's machines actually run at a wire speed of 585 feet which makes some change in the percentage.)

This last table, the figures of which are also quoted in the opinion of the Circuit Court of Appeals in this case (Rec., p. 201) demonstrate, beyond question that, even as plaintiff claims defendant's machines are operated, the only difference between such operation and the operation of Lisbon Falls machines, which counsel in their brief, say, is open to the public, is merely a difference in degree.

It will be seen from the foregoing that we have not misused figures and that the statement in the caption on page 9 of plaintiff's reply memorandum that Carter Diagram No. 2 "proves the effect of pitch on defendant's machines to be nearly twice as great as the effect of drag" demonstrates that the predominating factor in bringing the speed of the stock into approximate equality with the speed of the wire is the initial velocity due to head; that velocity due to drag of wire is not eliminated, and that the three factors of gravity due to head, gravity due to pitch of wire, and acceleration due to drag of wire, are used in defendant's machines exactly as they are in the open-to-the-public Lisbon Falls machines, the proportions in which the factors are used, being varied and showing the correctness of the statement of plaintiff's expert above quoted that "the lower the head the more pitch is required," and also showing the correctness of the

following statement in the opinion of the Circuit Court of Appeals in this case (Rec., p. 192):

> "There are three factors, all or any two of which may be used, *in any preferred relative proportions*, to bring about the necessitated speed equality between the stock and the wire, 9 or 10 feet from the breast roll" (Italics ours).

Upon page 11 of the reply memorandum it is stated that if the prior art machines were adjusted "to carry the Eibel high pitch," it would be necessary, in addition to lengthening the adjusting screws, to make provision for elevating the suction boxes.

It is, of course, true that if the wire were raised away from the face of the suction boxes such boxes would need to be adjusted also to keep them in contact with the wire. This would require no change whatever in the machine, and if the suction boxes were attached to the side rails of the machine, as shown, for instance, in the drawing of the No. 2 Northern machine (defendant's exhibit R. 5, Rec., following p. 1084, sheet 135) the boxes would move with the wire, as it was elevated, and would always remain in contact therewith. The construction shown in this exhibit is held by the Circuit Court of Appeals to effectually dispose of claims 7 and 8 of the patent in suit which attempt to cover such adjustment of the suction boxes.

This is the only change that plaintiff can point out that would be required in prior art machines, besides the lengthening of the adjusting screws, to adapt them "to carry the Eibel high pitch."

The machine of the Barrett & Horn patent No. 691,333, requires no change whatever, as shown by the testimony of defendant's witnesses, to enable it to carry a pitch of at least 6 inches said to be "an Eibel high pitch"(Rec., pp. 770, 779).

Plaintiff's reply asserts (p. 6) that we are "unable

to prove by any evidence that will stand analysis a prior use pitch greater than 3 inches."

In making this statement, and in all its so-called "analysis" of the testimony, counsel ignore a fact which can not be ignored, namely, that the prior uses which we present of 4 to 6 inch pitches are not discontinued or abandoned prior uses as to which the testimony of witnesses is likely to be at fault. At Bayless-Austin, Kimberly-Clark and Lisbon Falls the same machines which they have in use today were in use prior to Eibel's date, in the same mills, in the same manner, and by the same people who testify. Their use has been continuous and their manner of use unchanged. The testimony of the witnesses Brown, Anderson, Bayless, Thom, Dickinson, etc., proves these facts beyond question, unless contradicted. No substantial attempt has been made to contradict them although it was obviously open for plaintiff to see the machines at the time the testimony was taken, verify by observation the testimony as to their present construction and operation, and obtain witnesses to contradict any erroneous statement of our witnesses as to the identity of their construction and mode of operation ever since before the Eibel invention. The fact that plaintiff's counsel have not done this is a tacit admission.

The so-called "analysis" of the testimony to which the reply refers (p. 6) is most unfair to the witnesses, particularly in view of the absence of any contradiction of their statements. An example of this unfairness will be sufficient to characterize the "analysis" as a whole. Testimony of Barrett and Horne as to certain measurements of the tracing Exhibit V-5 and the corresponding blue print Exhibit V is quoted in plaintiff's brief (pp. 186-7) as contradicting their statements as to the measurements

of the Bayless-Austin machines and the court is left to suppose that the Bayless-Austin machines followed this tracing in exact measurements. This position falls to the ground and reflects seriously upon the whole fabric of counsel's argument when attention is called to the positive statements which counsel have omitted to quote to the contrary.

Barrett says (p. 811): "That (referring to Exhibit V-5 and Exhibit V) wasn't made for working drawing."

Horne says (p. 571): "I should say that the exact dimensions wasn't followed . . . when the castings were set up and any little difficulty arose, why, they would be changed so that we would overcome the difficulty without changing the drawings."

Purpose of Adjustments.

Plaintiff's reply states as follows (p. 14):

> "Defendant's brief pays very slight attention indeed to a fact of controlling weight in the consideration of the prior uses, namely, that the drainage adjustments are not shown ever to have been used in such a way as to bring the speed of the stock to equality with that of the wire, but on the contrary are definitely proved in almost all cases to have had exactly the opposite effect, namely, to cause the stock to move faster than the wire."

The reason why we did not devote more space to this alleged "overrunning" in the prior art machines than pages 215 to 217 of our brief was because we considered it too manifestly unfounded to merit the consumption of more space.

The allegation of "overrunning" is based upon the erroneous assumption that the highest heads were used with the lowest speeds and the alleged height of the heads seems to be based upon quotations from the testimony of Bayless and Anderson on page 182 of

plaintiff's brief which in the manner in which they are used are totally misleading.

Thus, it is unfair to quote Bayless as saying that the head was from 6 to 8 inches in the prior use of the machine. The purport of this testimony, taken as a whole, is that after acknowledging (p. 292 XQ. 90) lack of recollection even approximately as to the head in the early days Bayless gave 6 or 8 inches as the head in use at the present time then simply assumed that it might have remained the same although repeatedly saying that it might have varied (p. 493, XQ. 110, p. 716).

Plaintiff's brief is careful to avoid quoting the testimony of Brown who does recollect the head and in answer to cross examination states it very definitely as follows (p. 683):

> XQ. 223. What is the depth of the pond you have carried in these machines behind the slices?
>
> A. Various depths. On the average they are about 3 to 4 inches.
>
> XQ. 228. Have you carried a depth in your pond of 6 or 7 inches at times?
>
> A. I could not say.
>
> XQ. 229. You may or may not?
>
> A. May or may not, I could not say.
>
> XQ. 230. Did you ever get a depth of lower than 3 or 4 inches?
>
> A. Yes.
>
> XQ. 231. What is the lowest?
>
> A. Probably 2 inches.
>
> XQ. 232. What causes the depth of that pond to vary?
>
> A. You regulate the pond according to the grade you run for the formation of the sheet.
>
> XQ. 233. Do you use a deeper pond for heavier paper?
>
> A. No.
>
> XQ. 234. Do you use a deeper pond for lighter paper?
>
> A. Yes.

The context of the passages of Anderson's testimony, quoted in plaintiff's brief (p. 182), shows that he was referring to the head in the flow-box (see the flow-box at the left in the drawing of the Bayless-Austin machine, defendant's Exhibit V-5, Rec., following p. 1092, sheet 157, and also marked 10 in the Barrett and Horne patent No. 691,333 (Rec., p. 1042), and to the depth of stock "*in the apron*" leading from this flow-box over the breast roll, and not alone to the depth that governs the initial speed of the stock as it emerges under the slice. This will be clear from an examination of the large drawing used by plaintiff's counsel before the court.

Therefore, the only clear statement is that above quoted from Brown giving the average as about 3 to 4 inches. If now we substitute for the velocity of the stock assumed on page 282 of plaintiff's brief (330 feet per minute) the velocity corresponding with the 4-inch head maximum average stated by Brown we have 276 as the initial velocity of the stock at the maximum average head in the Bayless-Austin machine which is not greater than the 275 to 300 feet per minute wire speed assumed in plaintiff's brief (p. 183) and there was, therefore, no overrunning of the stock on the wire.

Since, however, Brown testifies that the head varied all the way from 4 inches down to 2 inches depending upon the lightness of the paper and the speed of the wire also varied to suit conditions it is absurd to assume any particular figure within these ranges for the purpose of attempting to attack the statements of the witnesses showing that the speed of the wire was equal to or greater than the initial velocity of the stock.

The use of pitched wires, in prior art machines, particularly at the Bayless-Austin and the Lisbon Falls mills, were not for drainage purposes, though undoubtedly securing better drainage, as plaintiff's expert, Aldrich, points out will be obtained by a so-

called "Eibel high pitch," (p. 27), but one of the purposes in using the pitched wires was to increase the speed of the stock on the wire, enabling the running of the machines "at a much higher speed" (Bayless, Rec., p. 705), and to make a smoother sheet, getting rid of cross waves on the paper (Dickinson, Rec., pp. 730-732). The same purpose was served by furnishing the Bagley and Sewall machines with a 3-inch pitch, and an 8-inch head (Lansing Rec., pp. 646-653). This is evident when we bear in mind that these Bagley & Sewall machines ran regularly and continuously at speeds of from 525 f. p. m. to 566 f. p. m. (Rec., p. 650). These were regular speeds. Lansing saw them frequently (pp. 650-651). They could not have made paper at these speeds without accelerating the stock on the wire by some means. They did it by the 3-inch pitch and the 8-inch head. As Lansing says, "the pitch down hill, plus the higher slice gave speed to the stock" (p. 658). This is obvious when we bear in mind the testimony of Aldrich, referred to by the Circuit Court of Appeals "that so far as speed equality is concerned, the same results can be secured from either head or pitch" (p. 200) and the further statement of Aldrich that, "the lower the head the more pitch is required" (p. 45), the converse being equally true that the *higher* the head the *less* pitch is required.

The Bagly and Sewall pitches also were clearly for speed, and were not merely drainage adjustments.

Respectfully submitted.

AMASA C. PAUL,
LIVINGSTON GIFFORD,
Counsel for Defendant-Respondent.

No. [redacted]

SUPREME COURT OF THE UNITED STATES.

October Term, 1905.

[redacted] PAPER COMPANY,
Petitioner,

v.

MINNESOTA & ONTARIO PAPER COMPANY,
Respondent.

PETITION FOR WRIT OF CERTIORARI

AND

BRIEF IN SUPPORT OF PETITION.

FREDERICK P. FISH,
GUY CUNNINGHAM,
HARRISON F. SYMAN,
of Counsel for Petitioner.

R. H. Lloyd, Law Printing and Map House, Boston.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1920.

EIBEL PROCESS COMPANY, PETITIONER,

v.

MINNESOTA & ONTARIO PAPER COMPANY, RESPONDENT.

PETITION FOR WRIT OF CERTIORARI

TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE FIRST CIRCUIT.

To the Honorable the Supreme Court of the United States:

The petitioner respectfully represents to this Honorable Court as follows: —

(1) This suit, alleging infringement of the patent to Eibel No. 845,224, issued February 26, 1907 (Rec. Vol. III, p. 2), for an improvement in Fourdrinier machines for making paper, was brought by the petitioner, Eibel Process Company, owner of said patent, in the District Court of the United States for the District of Maine against the respondent, Minnesota & Ontario Paper Company, by bill of complaint filed January 1, 1917.

(2) Said United States District Court, in a decree entered November 24, 1920 (Rec. Vol. I, pp. 176–192), held the claims in issue of said patent, viz., claims 1, 2, 3, 7, 8 and 12, valid and infringed by the respondent, and ordered an injunction and accounting.

(3) The respondent appealed from said decree of said District Court to the United States Circuit Court of Appeals for the First Circuit, which appeal came on for hearing before the said Court of Appeals on May 12, 1921, and thereafter said Court of Appeals on June 29, 1921, filed its opinion and entered a decree in said cause (Rec. Vol. I, pp. 207, 231) reversing the decree of the District Court, and holding the said patent invalid, and directing the dismissal of the bill with costs.

(4) Prior to the bringing of this suit, said Eibel patent had been held valid by the Circuit Court of Appeals for the Second Circuit in a suit brought by the petitioner on December 16, 1911, in the United States District Court for the Northern District of New York against the Remington-Martin Company, which suit came before the United States Circuit Court of Appeals for the Second Circuit on appeal from a decree of said District Court dismissing the bill, and was argued before said United States Circuit Court of Appeals for the Second Circuit on March 20 and 21, 1916, and in which suit, on April 11, 1916, said United States Circuit Court of Appeals for the Second Circuit rendered an opinion, holding said patent valid and infringed as to claims 1, 2 and 3 thereof (Rec. Vol. III, p. 113), and the mandate of said court conformable to said opinion duly issued thereafter.

(5) The machines charged in the Remington-Martin Company case, and held by the Court of Appeals for the Second Circuit in that case to be infringements of said Eibel patent, were in all material respects substantially identical with the respondent's machines charged to be infringements in the present case, and the method of operation practised in connection with said Remington-Martin machines was likewise substantially identical with the method of operation practised in connection with respondent's machines.

(6) The decision rendered by the Court of Appeals for the First Circuit in the present case is in conflict with the decision rendered by the Court of Appeals for the Second Circuit in said Remington-Martin suit as to the question of the validity of the patent. The Circuit Court of Appeals for the First Circuit says in its opinion in the present case, in summarizing its conclusions (Vol. I, p. 230):—

> "If we construe the language of the patent according to its natural import as claiming pitch sufficient to eliminate drag, there was no useful invention, and no infringement even if there was invention; if we construe the claims as plaintiff would have them construed, they cover merely a degree, and are void for indefiniteness."

On the contrary, the Court of Appeals for the Second Circuit in said Remington-Martin case held that the Eibel invention was highly useful, saying that its "commercial success has been wide and pronounced" (Vol. III, p. 120), held that the claims of patent were not void either for indefiniteness or as covering merely a difference in degree (Vol. III, pp. 122–125), and held that machines and methods of operation in all material respects identical with those in issue in the present case, infringed said patent.

(7) The decisions of the two Courts of Appeals conflict upon a fundamental question of patent law, apparent on the face of the patent in suit, namely, the question whether a claim is void for indefiniteness when infringement depends upon the meaning of an expression like "substantial elevation" or "high elevation". The Court of Appeals for the Second Circuit held that, "Where, as here, the principle of operation is made clear, the pitch [*i. e.*, elevation] is substantially higher than that theretofore known in the art, a different result is accomplished,

the subject-matter is incapable of exact expression in feet and inches and the worker in the art has no difficulty in following the directions, then a claim using the phraseology of Claims 1, 2 and 3 will not be held invalid. Any other construction might readily result in depriving a meritorious invention of its commercial value." (Vol. III, p. 125.)

On the other hand, the Court of Appeals for the First Circuit holds that "it will not do to assert, as plaintiff does, that 12-inch pitches are substantial and that 3 or 4-inch pitches (prior art) are negligible, leaving intervening pitches in limbo; a line must be drawn available practically, if not mathematically." (Vol. I, p. 222). Accordingly, although the defendants actually used a pitch of 14 inches, being almost identically that indicated in the drawing of the Eibel patent, and admittedly by every test a "substantial" pitch, the court held that, inasmuch as it was difficult to tell whether 5 or 6-inch pitches would be within the patent, the claims were void for indefiniteness, even as against a machine using a 14-inch pitch.

(The meaning and significance of the "elevations" or "pitches" referred to will be apparent when the two opinions are read).

(8) The defences set up in the present case against the validity of the patent differ in no material respect from the defences set up in said Remington-Martin case.

(a) The same prior patents in evidence in the present case, with one immaterial exception, viz., the patent to Barrett & Horne, No. 691,333 (which differs in no substantial way from the Barrett & Horne patent No. 634,228 relied on in the Remington-Martin case), were all set up in the Remington-Martin case and held by the Court of Appeals for the Second Circuit to demonstrate that "skilled men prior to Eibel" did not have "the faintest conception

of the principle of operation which characterizes the Eibel invention" (Vol. III, p. 122).

(b) In the Remington-Martin case there was evidence as to eight alleged prior uses, as to which the Court of Appeals said:—

> "We think it is clearly established that no one of the alleged prior users had any understanding or appreciation of the Eibel principle." (Vol. III, p. 122.)

In the present case there is evidence as to eleven similar alleged prior uses, all of them of substantially the same character as those in evidence in the Remington-Martin case, four of them being identical with four of the eight set up in the Remington-Martin case, and none of them being in any wise more pertinent. All were merely examples of prior art practices expressly referred to in the Eibel patent which involved merely slight machine adjustments for a wholly different purpose and with wholly different results from those of Eibel.

(c) The Court of Appeals for the First Circuit in the present case says that the Eibel patent is "nothing but an attempt to monopolize a difference in degree" (Vol. I, p. 223). But the Court of Appeals for the Second Circuit considered this question and resolved it in the negative (Vol. III, pp. 122–124).

(9) The question of the validity or invalidity of the Eibel patent and of the scope of its claims is one of great public importance, affecting the paper trade generally. The Court of Appeals for the Second Circuit in the Remington-Martin Company case said (Vol. III, p. 119) that "today Eibel's process is the practice of the art", and it appears in the present case that fifteen news paper manufacturers, which together produce about 3,400 tons of news paper per day or two-thirds of all the news paper manufactured in the country, are operating in accordance

with the disclosures of the Eibel patent and under licenses from the petitioner, and that a large number of other paper manufacturers are operating in a similar manner without license and in infringement of the patent (Vol. I, pp. 35, 36). Some of said licensees are located in the First Circuit, some in the Second Circuit, and some in other parts of the country; and said infringers are likewise located in various parts of the country, fourteen suits against such infringers being now pending in the First, Second, Third, Seventh, Eighth and Ninth Circuits as follows:—

In the Second Circuit.

Iroquois Pulp & Paper Company, District Court, Northern District of New York.

Malone Paper Company, District Court, Northern District of New York.

Defiance Paper Company, District Court, Western District of New York.

In the Third Circuit.

Union Bag & Paper Company, District Court, District of New Jersey.

In the Seventh Circuit.

Alexandria Paper Company, District Court, District of Indiana.

Consolidated Water Power & Paper Company, District Court, Western District of Wisconsin.

Grandfather Falls Company, District Court, Western District of Wisconsin.

Tomahawk Pulp & Paper Co., District Court, Western District of Wisconsin.

Wisconsin River Paper & Pulp Co., District Court, Western District of Wisconsin.

Dells Paper & Pulp Co., District Court, Western District of Wisconsin.

In the Eighth Circuit.

Northwest Paper Co., District Court, District of Minnesota, Fifth Division.

Hennepin Paper Co., District Court, District of Minnesota, Fifth Division.

Watab Pulp & Paper Co., District Court, District of Minnesota, Fifth Division.

In the Ninth Circuit.

Inland Empire Paper Co., District Court, Eastern District of Washington, Northern Division.

It is of great importance to the licensees and the infringers alike that the question of the validity or invalidity of the Eibel patent and the scope of its claims be finally determined by this Court, in view of the conflicting decisions of the Court of Appeals in the First and Second Circuits.

(10) The question of law as to whether patent claims cast in the form of those of the Eibel patent are void for indefiniteness, as the Court of Appeals for the First Circuit has held in this case, or whether they are valid, as held by the Court of Appeals for the Second Circuit, is a question of great and general public importance. The Court of Appeals for the Second Circuit has reaffirmed its decision on this point rendered in said Remington-Martin case, in several opinions subsequent to its decision in said Remington-Martin case, citing its said decision as authority, which opinions include the following: —

> *Vacuum Cleaner Company* v. *Innovation Electric Co., Inc.*, 239 Fed. 543, 547.
>
> *General Electric Company* v. *Nitro-Tungsten Lamp Co.*, 266 Fed. 994, 1000.

The present decision of the Court of Appeals for the

First Circuit conflicts not only with said decision of the Court of Appeals for the Second Circuit, but with the decision of this Court in *Tilghman* v. *Proctor*, 102 U.S. 707, 729.

(11) The invention disclosed in the Eibel patent has been of very great practical advantage to the paper making art. The Court of Appeals for the Second Circuit found that by its use machines have been speeded up from an average production of 400 or 450 feet per minute to over 680 feet per minute (Vol. III, p. 120). Judge Hale in his opinion in the present case said (Vol. I, p. 187):—

> "As a result of using the high pitch, taught by Eibel, the proofs show that the paper machines have been able to increase their speed from 25 to 30 per cent, or even more."

The record shows that the immediate result of the successful demonstration by Eibel of his invention was that in the very year that the patent issued, 1907, the invention as disclosed in the patent was adopted by news paper manufacturers throughout the country, the report of the invention having been spread about by travelling papermakers and by descriptions in trade journals. Its use has resulted in an extraordinary increase in the productiveness of paper machines and labor.

(12) The petitioner believes and represents that the decisions of the Court of Appeals for the Second Circuit in said suit against the Remington-Martin Company, and of his Honor Judge Hale in this cause, holding said Eibel patent valid and infringed, were right, just and conformable to law, and that the contrary decision of the Court of Appeals for the First Circuit in this cause was erroneous.

Wherefore the petitioner respectfully prays:—

That a writ of certiorari may be issued out of and under the seal of this Honorable Court, directed to the United

States Circuit Court of Appeals for the First Circuit, commanding said Court to certify and send to this Court a full and complete transcript of the record of all of the proceedings in this cause, to the end that said cause may be reviewed and determined by this Court, as provided by law; and that the petitioner may have such other and further relief as to this Court may seem appropriate and in conformity with law.

FREDERICK P. FISH,
HARRISON F. LYMAN,
of Counsel for Petitioner.

I hereby certify that I am of counsel for petitioner herein, Eibel Process Company; that in accordance with the request of said petitioner the foregoing petition has been prepared; and that the allegations contained in said petition are true, to the best of my knowledge and belief; and that said petition is, in my opinion, well founded in law and in fact, and should be granted.

FREDERICK P. FISH.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1920.

EIBEL PROCESS COMPANY, PETITIONER,

v.

MINNESOTA AND ONTARIO PAPER COMPANY, RESPONDENT.

BRIEF IN SUPPORT OF PETITION.

This is a suit brought by the petitioner alleging infringement by the respondent of Eibel patent No. 845,224 issued February 26, 1907, for an improvement in Fourdrinier machines for making paper (Rec. Vol. III, p. 2). The suit was brought in the United States District Court for the District of Maine and that court (Hale, J.) held the patent valid and infringed and ordered the usual injunction and accounting (Rec. Vol. I, p. 176; 267 Fed. 847).*

Upon appeal to the Circuit Court of Appeals for the First Circuit that court reversed the decision of the Dis-

* For the convenience of the court we have printed as a separate pamphlet and submit herewith copies of the opinions of Judge Hale and of the Court of Appeals for the First Circuit in this case and a copy of the opinion of the Court of Appeals for the Second Circuit in *Eibel Process Company* v. *Remington-Martin Company*, 234 Fed. 624.

trict Court (Rec. Vol. I, p. 207), holding the patent invalid on the ground (p. 230) that if the language of the patent is construed "according to its natural import" "*there was no useful invention*", and if on the other hand the claims are construed in accordance with plaintiff's contention "they *cover merely a degree*" and are "*void for indefiniteness*". The substance of the decision then is that the patent is void either because it covers no useful invention or because the claims cover merely a difference in degree and are lacking in definiteness. The court appears to think that the claims, properly construed, are not infringed, but does not definitely so hold, and places its decision rather on the ground that the patent is void for one or the other of the reasons mentioned.*

A review of this decision of the Court of Appeals for the First Circuit is sought by the present petition for *certiorari*.

THE GROUNDS FOR THE APPLICATION FOR CERTIORARI.

The grounds upon which the writ of certiorari is asked are, briefly summarized, as follows: —

1. The decision of the Circuit Court of Appeals for the First Circuit here sought to be reviewed is in conflict with a previous decision of the Circuit Court of Appeals for the Second Circuit holding the Eibel patent valid and infringed as to claims 1, 2 and 3 (*Eibel Process Company* v. *Remington-Martin Company*, 234 Fed. 624, opinion written by Mayer, J., decided April 11, 1916, Rec. Vol. III, p. 113).

* The reference in the last paragraph of the opinion to the repayment of money paid by the appellant to the appellee, *pendente lite* under order of court, refers to certain moneys paid to the appellee as security on account of the suspension of a preliminary injunction originally granted by the District Court.

2. The question of the validity of the Eibel patent is one of great general importance throughout the paper trade, it appearing that about two-thirds of all the news paper manufactured in the country is made by some fifteen licensees on machines operating in accordance with and licensed under the Eibel patent here in suit and that most of the remaining one-third is made on infringing unlicensed machines. The licensees are located some in the First Circuit, some in the Second Circuit and others in other circuits. It is of great importance to them that there should be an authoritative decision by this Court as to the validity of the patent in order that they may determine whether or not to cancel their licenses and cease to pay royalties. The infringers likewise are scattered throughout the country. There are now pending fourteen suits against such infringers; three in the Second Circuit, one in the Third Circuit, six in the Seventh Circuit, three in the Eighth Circuit and one in the Ninth Circuit (*infra*, p. 30). An authoritative decision by this Court settling the conflict between the courts in the First and Second Circuits is essential both for the guidance of the courts in which these fourteen cases are pending and in order to enable the infringers themselves to determine whether or not to take licenses.

3. An important question of law, of general public interest, is raised, namely, whether claims cast in the form of the Eibel claims are void for indefiniteness, as the Court of Appeals for the First Circuit has held, or may be valid as the Court of Appeals for the Second Circuit has held. Claims of this general sort are frequently before the courts, and have often been held valid on the authority of *Tilghman* v. *Proctor*, 102 U. S. 707, with which case the decision of the Court of Appeals for the First Circuit in the present case appears to conflict.

THE EIBEL INVENTION.

The Eibel patent is to be found at Vol. III of the record, page 2.

The Fourdrinier machine to which the invention relates, and Eibel's improvement, are well described in the opinion of the Court of Appeals for the Second Circuit (Vol. III, page 113 et seq.).

We believe, however, that for present purposes the following brief summary will be sufficient: —

The Fourdrinier machine is one of the best known forms of paper making machine, and is universally used for making news paper. It consists essentially of an endless wire sieve or "wire" of fine mesh, the wire being 100 or more inches wide, and traveling over rollers, for a working distance of 30 feet more or less, at a constant speed. On the top of the wire at the beginning of its course there is discharged a stream of paper making stock consisting of wood pulp fibres and water, the stream having a thickness of, say, a half inch to an inch, and extending across the full width of the wire. As the stock travels along with the wire, the water drains from it through the wire and the fibres felt themselves into a moist web or sheet which at the farther end of the wire's upper course is stripped from the wire and is passed through a series of presses, driers and calendars, to be discharged at the "dry end" of the machine as finished paper. These machines are extremely expensive, costing $100,000 or more, and are run night and day continuously, to get the greatest possible return on the heavy investment, the utmost possible production, consistent with making good paper, being always eagerly sought.

Prior to Eibel it had been the regular practice to run this wire in a horizontal direction (although in some instances referred to on the face of the patent means had

been provided to raise or lower the breast roll or front end of the wire slightly an inch or two above or below the level in order to regulate the drainage of the stock — a purpose having nothing to do with Eibel's invention). The only agency, therefore, tending to accelerate the stock from the initial speed at which it entered upon the wire to the greater speed of the wire, which speed it must have attained by the time the stock becomes felted to the wire, was the friction between the more rapidly moving wire and the less rapidly moving stock, *i. e.*, the "drag" of the wire.

The speed at which the wire is run determines, of course, the speed at which paper is produced. Prior to Eibel's invention it had been found impossible to run the wires on these machines fast enough to produce paper at speeds in excess of about 500 feet per minute and the usual speeds did not exceed 450 feet per minute (Vol. I, p. 187), the difficulty being that when higher wire speeds were attempted great commotion resulted in the stock on the wire which did not subside before the critical stage of paper formation was reached, with the result that the paper formed was irregular or "wild", unsalable and liable to break while passing through the driers.

Eibel discovered that the reason for this excessive commotion when higher speeds were attempted was that "drag" was inadequate to accelerate the stock rapidly enough to produce the necessary speed equality at the proper stage on the wire, and his invention consisted in giving the wire a *steep downhill pitch* so as to invoke the aid of gravity on the wire as an additional means of accelerating the stock to speed equality with the wire, the extent of the pitch being *correlated to the proposed wire speed and to other conditions prevailing on the machine*, to the end that speed equality between stock and wire might be produced at the critical stage on the wire, before

the active felting of the stock took place. Eibel was thus enabled to run his wire at speeds very greatly in excess of anything theretofore known and yet to avoid the waves and ripples or commotion of the stock on the wire, and so to make good paper at these increased speeds.

The Eibel patent issued in February, 1907, the invention having been worked out by Eibel on machines of the Rhinelander Paper Company at Rhinelander, Wisconsin, of which he was superintendent, a short time previously. As soon as Eibel had demonstrated the success of the invention by his work at Rhinelander, the news of it was spread broadcast throughout the country by trade journals and traveling paper makers, and it was instantly seized upon by practically the whole art, so that in the very year 1907 when the patent issued Eibel's high pitch was substituted for the flat wire which they had been previously using, by practically all news paper manufacturers throughout the country, with the result that production on the Fourdrinier machine was increased on an average from 25 to 30 per cent, the only speed limitations remaining being other conditions, such as strength of machine parts, drying capacity and ability of the workmen to handle the paper at high speeds.

Eibel in his specification (Eibel patent, p. 1, lines 82 *et seq.*) refers to certain prior art adjustments used for the purpose of regulating drainage of the stock, these adjustments having been only minute in extent (usually a couple of inches or so) and either uphill or downhill, according to the grade of the stock used; and discriminates his invention therefrom not only because of his new principle of operation, not employed at all in connection with the drainage adjustments, but also because his invention requires the use of a substantial pitch or elevation as distinguished from these trifling drainage adjustments, the extent of which would be inadequate to accomplish any

useful result so far as Eibel's purpose was concerned. The prior patents and "prior uses" set up in this case are mere examples of these drainage adjustments referred to on the face of the Eibel patent and even these were only rarely used, the general practice, particularly on the highest speed machines, having been, as the evidence shows, to run the wires absolutely level.

The record shows, out of the mouths of defendants' own witnesses, that when Eibel first demonstrated his invention at Rhinelander the news of it was carried by traveling paper makers "from mill to mill", and "this Rhinelander scheme of raising the wire" "soon became general knowledge" (Vol. II, p. 364, X-Q. 427–438; p. 294, X-Q. 331, 332); that the use of the high pitch spread "like wildfire" (Vol. II, p. 652, X-Q. 267) throughout the country and was adopted by news-paper mills generally in the very year 1907 when the patent issued (Vol. II, p. 364, X-Q. 427–438; p. 443, X-Q. 122; p. 660, X-Q. 366) although the reports of Eibel's work were at first regarded by workers in the art as "a fish story" (Vol. II, p. 154, X-Q. 323, 334, 335) and the pitch as "a new thing" which "they wanted to see the other fellow try out" before they would adopt it (p. 157, X-Q. 360–363); and that by the use of the invention the output of Fourdrinier machines has been increased by 25 or 30 per cent or more (Hale, J., Vol. I, p. 187).

The Court of Appeals for the Second Circuit in the Remington-Martin case says (Vol. III, pp. 119, 120) that that "*today Eibel's process is the practice of the art*" and that by its use "the machines have been speeded up from an average of 400 to 450 feet per minute to over 680 feet per minute; and that speed may, at any time, be exceeded, for the only limits which remain are certain practical factors such as strength of machine parts, drying capacity and ability of the workmen in handling the papers".

THE INFRINGEMENT.

The defendant's machines (there are four of them) have wire pitches of 14 inches (Vol. I, p. 221) and run at paper speeds of about 600 feet per minute (Vol. I, p. 9). In the Remington-Martin case, in the Second Circuit the pitches of the wires of the two machines in issue were, respectively, 18 and 20 inches, and these machines ran at speeds of 550 and 575 feet respectively per minute (Vol. III, p. 120). Both in the Remington-Martin machines and in the defendant's machines in this case the pitch used was at least as great as the pitch depicted on the figure of Eibel's patent, which, as the Court of Appeals in the present case says, is about 14 inches (Vol. I, p. 211).

There is no denial that by the use of these 14-inch pitches the defendant is enabled to obtain much greater production than it could get without them. Indeed, the defendant asserted in its brief on appeal from an order of the District Court granting a preliminary injunction, as a reason why that preliminary injunction should be suspended, that *"Even if these machines were altered over to conform to what plaintiff asserts is open to the public, its output would be reduced to such an extent, according to the admissions of the plaintiff itself, that defendant would be required to install two additional machines, costing $100,000 each, and requiring months to procure and install before it could equal its present output."*

THE BASIS OF THE OPINION OF THE COURT OF APPEALS FOR THE FIRST CIRCUIT IN THIS CASE.

The difference of view between the Court of Appeals for the First Circuit and the Court of Appeals for the Second Circuit as to the validity of the Eibel patent, aside from their primary difference as to the sufficiency of the Eibel claims as regards definiteness, depends largely upon the difference between the views which these two courts respectively took as to the pertinency and effect of the breast-roll adjustments of the prior art, of the type referred to on the face of the Eibel patent.

The Eibel patent (p. 1, line 80, Rec. Vol. III, p. 3) says that although, prior to Eibel, the wire "has usually been arranged to move in a horizontal plane", nevertheless means have sometimes been provided "for adjusting the breast-roll end of the wire to different elevations, usually below the level, to provide *for running with different grades of stock, as, for instance, with quick stock and slow stock;* but so far as I am aware the making-wire has always had to perform the work of drawing along the stock". . . .

The phrase "quick stock" means stock which parts with its water quickly or freely — it is sometimes called "free stock". The phrase "slow stock" means stock which is retentive of its water, so that the drainage of the water from it is comparatively slow. It is essential that the pulp when it reaches the "dandy roll" and the couch roll be of a certain predetermined consistency as to water content, and the purpose of these prior art adjustments referred to in the patent was to compensate for differences in the quality of stock as to water retentiveness. If the stock being used was a "slow" stock the wire might be caused to run uphill an inch or two so as

to give the stock a longer time to drain on the wire before reaching the dandy roll and couch rolls than if the wire were horizontal, while if the stock was a "quick" stock, that is, one which drains rapidly, the breast-roll might be elevated an inch or two above the level so as to carry the water farther down the wire before draining off than it would go if the wire were absolutely level. These adjustments were what is known in the record as "drainage adjustments".

The prior patents and so-called "prior uses" in the present case, as in the Remington-Martin case, were merely illustrations of these drainage adjustments.

In every instance of alleged prior use in this case, as in the Remington-Martin case, it was definitely admitted by one or more witnesses that the purpose of the adjustment used was drainage regulation, although in both cases alike a number of witnesses claimed that they had knowledge of the Eibel principle, before Eibel.

In no instance was any greater adjustment than about three inches proved to have been used — a degree of pitch inadequate to get any practical advantages for Eibel's purpose even if intelligently used for his purpose of increasing speeds (*infra*, p. 35).

In nearly all cases also it was proved that these adjustments of the prior art, when used at all, were used under such conditions as to operate in diametric opposition to the Eibel principle, being used on machines in which the initial speed of the stock as it entered upon the wire was already as great as or greater than the wire speed, so that any trifling effect the adjustment had on stock speed acted to increase, instead of diminishing, difference of speed between stock and wire and to increase instead doing away with commotion of the stock (*infra*, p. 36).

The Court of Appeals for the First Circuit nevertheless finds no difference in principle between these prior art

drainage adjustments and Eibel, and therefore concludes that Eibel's claims cover a *mere difference in degree*. The Court says (Vol. I, p. 228):

> "The plaintiff seeks to avoid the effect of admitted prior use of pitches, which we must and do find to have been substantial, by contending that such pitches were adopted for drainage purposes only; that they were applied in ignorance of the alleged new principle discovered by Eibel. So contending, plaintiff's argument falls little short of claiming an absolute monopoly for Eibel of the use of gravity through pitch. But long before Eibel people knew that water would run downhill and that the steeper the hill the faster the water would run. Moreover, drainage depends in part upon speed, and paper makers must have observed the relation, whether running the stock uphill or down-hill."

The Court thus apparently holds, in spite of the fact that no drainage adjustment ever used involved an extent of pitch sufficient to give any materially useful or even observable result by way of increased speed, in spite of the fact that at the time of Eibel's invention it was the general practice to run machines with the wires absolutely flat, making no use of any drainage adjustments at all, and in spite of the fact that just as soon as Eibel's invention appeared his high pitch was immediately adopted by the whole art as the means of getting the ardently desired, increased production, that nevertheless the users of the drainage adjustments *must have known of the Eibel principle because they knew that water would run downhill and that the steeper the hill the faster it would run*, and must have observed a relation between drainage and speed.

The Court furthermore holds that the claims are void for *indefiniteness* because they establish no definite divid-

ing line between what is and what is not within the patent, the term "substantial elevation" or "high elevation" putting the burden, the court says, upon the reader of the patent of knowing what pitches have been used in the prior art. The opinion says that the Eibel patent states no "practically definite limit", that the defendant "was entitled to all uses of its own machine not particularly pointed out and distinctly claimed in Eibel's patent", and that the "Eibel patent is nothing but an attempt to monopolize a difference in degree" (Vol. I, p. 223).

The only escape which the Court of Appeals for the First Circuit sees from the conclusion that the patent is void as covering a mere difference of degree, and for indefiniteness, is to construe the claims as being limited to a machine having such a pitch that *the drag of the wire is eliminated entirely* as an accelerating means. But it is quite impossible to do away with "drag" or friction between stock running at one speed and a wire running at a different speed,—just as impossible as it is to do away with any other law of nature. *Drag never can be eliminated* in such a situation, and to read the claims as requiring the elimination of drag would, as the Court of Appeals says, mean that they cover no "*useful invention*". It would confine them to a machine which has never been used by anyone anywhere, neither by the defendant, by the Remington-Martin Company or even by Eibel himself in his own installation at the Rhinelander Paper Company, where his invention was worked out. Indeed it would mean that the very pitch illustrated in the drawing of the Eibel patent when the machine is run at the speeds contemplated by the patent, does not involve his invention. (See the testimony of defendant's expert, Carter, Vol. II, p. 723, X-Q. 180, 181; and opinion of Hale, J., Vol. I, p. 190.) Of course on such a construction the Eibel patent

is invalid as embodying no "useful invention", and the Court of Appeals for the First Circuit so holds.

On one or the other horn of this dilemma, then, the Court of Appeals for the First Circuit concludes that the patent is impaled.

On the matter of infringement, the Court of Appeals says that the natural import of the language of the patent would mean that the claims are limited to a machine in which all drag is eliminated, in which case, of course, there would be no infringement (as well as no useful invention); but there is no definite holding to this effect and the Court instead rests its decision on the ground of invalidity.

THE BASIS OF THE CONFLICTING OPINION OF THE COURT OF APPEALS FOR THE SECOND CIRCUIT IN THE REMINGTON-MARTIN CASE.

On facts as to infringement substantially identical with those in the present case, and over a showing of the prior art in all material respects the same as in the present case, the Court of Appeals for the Second Circuit in a suit against the Remington-Martin Company, decided in 1916, held the Eibel patent valid and infringed (Rec. Vol. III, p. 113; 234 Fed. 624).

The Court of Appeals for the Second Circuit Holds the Claims Not Void for Indefiniteness.

The first and most obvious difference between the views of the two courts lies in their opposite views as to the alleged "indefiniteness" of Eibel's claims. Whereas, as we have shown, the Court of Appeals for the First Circuit says the claims are "void for indefiniteness" and says that a line between what is and what is not a substantial pitch "must be drawn available practically, if not mathematically", and that "in the Eibel patent we find no such

limit" (Vol. I, pp. 222, 223), the Court of Appeals for the Second Circuit, on the contrary, after careful consideration of this contention, held the claims valid. We quote that portion of the opinion of the Court of Appeals for the Second Circuit dealing witn this matter (Vol. III, p. 124):—

> "(3) Indefiniteness of claims. It is urged that the use in Claims 1, 2 and 3 of such words as 'substantial elevation' 'high elevation' and 'rapidly' renders the claims void for indefiniteness and uncertainty.
>
> "It is apparent that Eibel's invention is not susceptible of definition in terms of inches or feet per minute. As Little testified:—
>
> > "'The exact speed for any particular pitch was something which could not be accurately determined in advance, owing to variations in stock used, paper desired and construction of machines. Such determination is not, in fact, necessary. The grade is to be arranged to give a rapid gravity flow of the stock, and the machine then speeded up to meet it as long as the sheet remains smooth.'
>
> "Any attempt to define lower and upper limits would have been an invitation to infringers.
>
> "The practical workers in the art had no difficulty in understanding that the pitch must be higher than three or four inches, and that the pitch of the wire and the wire speed must be so correlated that gravity will accelerate the stock to speed equality with the wire.
>
> "It is difficult to lay down a rule and it is best to confine the test of indefiniteness to the facts of a particular case. *Where, as here, the principle of operation is made clear, the pitch is substantially higher than that theretofore known in the art, a different result is accomplished, the subject-matter is incapa-*

ble of exact expression in feet and inches and the worker in the art has no difficulty in following the directions, then a claim using the phraseology of Claims 1, 2 and 3 will not be held invalid.

"Any other construction might readily result in depriving a meritorious invention of its commercial value." (Italics ours.)

The Court of Appeals for the Second Circuit has several times since its decision was rendered in the Remington-Martin case, reiterated the doctrine there stated, citing that case as authority.

Thus in *Vacuum Cleaner Co.* v. *Innovation Electric Company*, 239 Fed. Rep. 543, 546, the Court of Appeals for the Second Circuit said: —

"It is further contended by the defendant that the words 'narrow inlet-slot' should either be confined to a very narrow slot of one-half inch in width or under, or should be regarded as void for indefiniteness. It was said by this Court in the recent case of *Eibel Process Co.* v. *Remington-Martin Co.*, 234 Fed. 624,—C. C. A.—, where it had been urged in argument that such words as 'substantial elevation,' 'high elevation', and 'rapidly' rendered the claims void for indefiniteness and uncertainty:

"'It is difficult to lay down a rule, and it is best to confine the test of indefiniteness to the facts of a particular case. Where, as here, the principle of operation is made clear . . . and the worker in the art has no difficulty in following the directions, then a claim using the phraseology of claims 1, 2 and 3 will not be held invalid. Any other construction might readily result in depriving a meritorious invention of its commercial value.'"

Again, in *General Electric Co.* v. *Nitro Tungsten Lamp Co.*, 266 Fed. Rep. 994, 1000, in answer to a contention that the claim in suit was open to the charge of indefiniteness, the same court said: —

> "We reassert the statement of *Eibel, etc. Co.* v. *Remington, etc. Co.*, 234 Fed. at page 632, 148 C. C. A. 390, that it is well not to attempt definition, but to consider the alleged indefiniteness of a claim in the light of the facts of each particular case . . . When a claim defines achievement in words no broader than the disclosure, and in phrases which, as interpreted by competent workers in the art, tell one how to do what the patentee did, it can rarely be called indefinite."

The Court of Appeals for the First Circuit in the present case criticises the Remington-Martin decision, saying that

> "there is nowhere in the opinion of Judge Mayer any discussion of the importance of drawing a sharp line between the degrees of pitch shown in the prior art and [illegible]t which is alleged to be covered by the Eibel inv[illegible]ion." (Vol. I, p. 225.)

The Court of Appeals for the First Circuit, therefore, because it thinks it difficult to say whether a 6-inch pitch is or is not a substantial pitch, holds the claims invalid even as against 14-inch pitches which admittedly by every test are most substantial and are indeed almost identically the pitch indicated in the drawing of Eibel's patent (*supra*, p. 18). In holding the Eibel claims valid, the Court of Appeals for the Second Circuit was, however, in spite of this criticism of the Court of Appeals for the First Circuit, merely following the decision of this Court in *Tilghman* v. *Proctor*, 102 U. S. 707, where the claim read as follows (p. 721): —

> "The manufacturing of fat acids and glycerine from fatty bodies by the action of water *at a high temperature and pressure.*"

This claim was held by this Court not void for indefiniteness, but valid, and it was furthermore held infringed, although the specification referred to a temperature of 612° F., while the defendant used a temperature of only 310° F. (p. 732). In the present case Eibel shows in the drawing of this patent a pitch of almost identically the same extent as that which defendant uses in its machines (*supra*, p. 18). Other cases to the same effect as *Tilghman* v. *Proctor* are *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U.S. 403, 437; *Woerheide* v. *H. W. Johns-Manville Co.*, 215 Fed. 604; affd. 220 Fed. 674.

The Court of Appeals for the Second Circuit Holds that Eibel Differs in Principle and not Merely in Degree from the Prior Art and Covers a Highly Useful Invention.

The Court of Appeals for the Second Circuit not only differs from the Court of Appeals for the First Circuit on the matter of definiteness of the claims, but also finds no such dilemma as that stated by the Court of Appeals for the First Circuit. The basis of the reasoning of the Court of Appeals for the First Circuit in this matter was its view that the prior art drainage adjustments differed only in degree from Eibel's high pitch, from which it followed, as the Court thought, that unless the claims were void as covering a mere difference in degree, they must be construed as requiring the elimination of all drag, in which case they would not cover a useful invention. The Court of Appeals for the Second Circuit takes an opposite view as to the pertinence of these prior art drainage adjustments. Its views on this point may be gathered from the following quotations from its opinion (Vol. III, p. 122): —

"(1) The prior patents. Six United States and ten foreign patents were received in evidence. All show means for effecting a slight adjustment of the breast roll and none amounts to more than an illustration of the drainage adjustment which Eibel fully understood and referred to in his patent. *The patents demonstrate that skilled men prior to Eibel did not appreciate the possibility of raising the breast roll end of the machine more than an inch or two and that none of them had the faintest conception of the principle of operation which characterizes the Eibel invention.*

"(2) Prior use. *We think it is clearly established that no one of the alleged prior users had any understanding or appreciation of the Eibel principle.*"

The Court of Appeals for the Second Circuit then proceeds to consider the eight prior uses in evidence and continues:—

"Within the limits of an opinion, it is not possible to analyze the testimony as to prior use in further detail. We think the evidence establishes that *no one before Eibel had any knowledge of his theory, that where not abandoned, the slight pitches were used, in most instances, to bring stock to the dandy roll more quickly than when the horizontal wire was used, thus giving it less time to drain and causing it to reach the dandy roll in a more fluid condition;* and, in any event, if there remained any doubt as to patentable novelty, that doubt would be resolved in this case in favor of the patent by commercial utility."

Since, then, the Court of Appeals for the Second Circuit found that these drainage adjustments of the prior art did not embody or foreshadow the Eibel principle, it held the patent not void as covering a mere difference in

degree, and of course found no reason for reading into the claims the limitation that the pitch must be such as to eliminate drag (an utter impossibility), which would make them cover no "useful invention", but on the contrary found that the commercial success of the invention "*has been wide and pronounced in an art where time means money and increased production at practically no increased expense reflects itself in increased profits*". (Vol. III, p. 120.)

THE DEFENSES IN THE REMINGTON-MARTIN CASE WERE SUBSTANTIALLY IDENTICAL WITH THOSE SET UP IN THIS CASE.

In an appendix to this brief we have shown (*infra*, p. 33) that there is no substantial difference between the defenses set up in the present case as against the validity of the patent by way of prior patents or "prior uses" and those which were set up in the Remington-Martin case, and also that the question of infringement in this case is identical with that in the Remington-Martin case; and we refer the court to this discussion if it should be asserted by respondent that differences in the record were responsible for the different results reached by the two courts of appeals. The court will find that the only new evidence in the present case was (1) mere cumulative repetition of the same sort of prior use drainage regulation adjustments, of which there were many examples proved in the Remington-Martin case, and (2) a new *argument* as to the construction of the Eibel claims, not advanced in the Remington-Martin case. Even if the records did differ, however, and to a material extent, the practical administration of justice would require, in the interest of the numerous licensees and infringers, as well as of the plaintiff, the intervention of this Court to settle definitely the status of this patent.

THE PUBLIC INTEREST OF THE PAPER TRADE GENERALLY REQUIRES AN AUTHORITATIVE DECISION BY THIS COURT AS TO THE VALIDITY OR INVALIDITY OF THE EIBEL PATENT.

There are fifteen licensees under the Eibel patent, who together manufacture two-thirds of the news paper manufactured in the United States (Vol. I, pp. 35, 226). Each of these licensees is paying royalties to the plaintiff, and all of them have the right to cancel their licenses if the Eibel patent is held invalid by a court of last resort. Cancellation of the license, however, will subject the licensee to liability to suit as an infringer.

The patent was held valid by the Court of Appeals for the Second Circuit, and has now been held invalid by the Court of Appeals for the First Circuit.

Some of these licensees are located in the First Circuit, some in the Second Circuit and some in other circuits.

In the absence of an authoritative decision by this Court, it is obvious that these licensees are in a most embarrassing position, those in the First Circuit being free to cancel their licenses and pay no further royalties, while those in the Second Circuit must continue to pay royalties, and those in other circuits do not know where they stand.

There are also many infringers of the patent, suits against fourteen such infringers being now pending in five different circuits, the Second, the Third, the Seventh, the Eighth and the Ninth (*supra*, p. 6).

The concerns charged with infringement in these suits are, in view of the conflict between the Court of Appeals for the First Circuit and the Court of Appeals for the Second Circuit, in a state of intolerable uncertainty as to their rights. They do not know whether they ought to

take licenses under the patent, or whether they ought to contest the suits.

Moreover, the courts before whom these cases are pending need the guidance of this Court in the premises, since otherwise they may follow the Court of Appeals for the First Circuit or the Court of Appeals for the Second Circuit, and a state of intolerable chaos and uncertainty, causing endless litigation, and tending to create distrust of judicial decisions will result.

The situation is one in which an authoritative decision from this Court settling the conflict is imperative, not only in the interest of the plaintiff but in the interest of the numerous licensees, of the infringers, and of the public generally.

We therefore respectfully submit that the petition for certiorari should be granted.

FREDERICK P. FISH,
GUY CUNNINGHAM,
HARRISON F. LYMAN,
of Counsel for Petitioner.

APPENDIX.

THE SAME DEFENCES AS AGAINST VALIDITY OF THE PATENT WERE SET UP IN THE TWO CASES.

There was no substantial difference in the record before the Court of Appeals for the First Circuit in the present case and the record before the Court of Appeals for the Second Circuit in the Remington-Martin case, so far as concerns attacks on the validity of the patent.

Indefiniteness.

As we have seen, the same argument as to *indefiniteness of claims* adopted by the Court of Appeals for the First Circuit was considered and rejected by the Court of Appeals for the Second Circuit, because the Court was convinced that the practical workers in the art had no difficulty in understanding what the patent called for as to pitch.

The evidence in the present case that the practical workers in the art have no difficulty to discriminating between what is and what is not a substantial pitch is at least as clear as it was in the Remington-Martin case.

Prior Patents.

The showing of the prior art in the two cases was also in all material respects the same.

There were some ten prior patents set up by defendant in the Remington-Martin case, and the same ten prior patents with only one additional patent (Barrett & Horne patent No. 691,333) are in the present record. This Barrett & Horne patent is a mere improvement on an earlier Barrett & Horne patent No. 634,288, which was in evidence in the Remington-Martin case, and in no way adds to the showing of the previous patent. This matter is not

discussed in the Court of Appeals decision, but is discussed by Judge Hale (Vol. I, p. 184).

Prior Uses.

In the Remington-Martin case there was evidence of eight alleged prior uses, all of which are referred to in the opinion of the Court of Appeals for the Second Circuit (Vol. III, pp. 122, 123). In the present case there was evidence of twelve similiar prior uses, none of which is discussed in the opinion. Four of these "prior uses" are identical with four of those referred to in the testimony in the Remington-Martin case (viz., Northern Paper Company, Palmer Falls, International Paper Company at Niagara Falls, and Rhinelander Paper Company), and the other instances of alleged prior use are in no way more pertinent or material than the prior uses in evidence in the Remington-Martin case.

The only "prior use" expressly referred to by the Court of Appeals for the First Circuit in this case is that at the Northern Paper Company (Vol. I, p. 215), as to which there was much fuller evidence in the Remington-Martin case and which was discussed by the Court of Appeals for the Second Circuit in its opinion in that case (Vol. III, p. 123) and dismissed.

The Court of Appeals for the First Circuit, while it speaks of "a large mass of convincing evidence as to prior use which was not in the Remington-Martin suit" (Vol. I, p. 225), refers specifically only to the Northern Paper Company prior use (which, as we have seen, was particularly considered and dismissed by the Court of Appeals for the Second Circuit in the Remington-Martin case); and elsewhere the court says that it has "not found it necessary to review in detail the great mass of evidence concerning prior uses, for, in the view we take of the case, the plaintiff's own admissions as to the nature and extent

of 4 or 5-inch prior uses conclude the point in the defendant's favor" (Vol. I, p. 224). The decision then is evidently not based on any prior use evidence peculiar to the present case and not in the Remington-Martin case, but on the admitted prior art drainage adjustments.

We shall not undertake here to discuss these prior uses in detail, but merely refer to three broad facts applicable generally to all the prior uses set up in this case and to those set up in the Remington-Martin case alike.

(1) In each and every one of these cases it appeared, just as it did in the case of each one of the prior uses set up in the Remington-Martin case, upon the statement of one or more of defendant's witnesses, that the purpose of the slight breast-roll elevation relied upon was drainage regulation — "to provide for running with different grades of stock,— as, for instance, with quick stock and slow stock", as referred to on the face of the Eibel specification (p. 1, lines 82–87),— a purpose which the Court of Appeals for the Second Circuit found had nothing in common with Eibel, but which the Court of Appeals for the First Circuit finds to differ from Eibel only in degree.

(2) In no case did any of these prior use drainage adjustments proved in the present case exceed approximately 3 inches in extent. Claims that they had used as much as 4 or 5 inches were made by certain witnesses, but in no case was anything above about 3 inches proved. (See the finding of Judge Hale with regard to the Lisbon Falls prior use, chiefly relied upon by defendant, Vol. I, p. 185.)

Pitches of this trivial extent, although adequate for drainage regulation, were proved in this case, as in the Remington-Martin case, to be quite insufficient for Eibel's purpose, by the unanimous testimony of many of defendant's practical witnesses. See, for example, the picturesque language of Hazel, who does not think that "raising or lowering the breast roll three inches amounts to a

darn", because "it does not have enough effect" (Vol. II, p. 302, X-Qs. 448–450). There was much other similar testimony, and nothing to the contrary from any practical witness.

As a matter of fact, the instances of drainage adjustment before the Court of Appeals in the Second Circuit were rather closer in extent to the Eibel pitch than any in evidence in the present case, for as the Court of Appeals for the Second Circuit says in its opinion (Vol. III, p. 119),

> "The prior art showed instances where the pitch of the wire had been two or three inches, *and in two isolated cases up to six inches*",

in both of which 6 inch cases, however, the Court found the pitch to have been used only experimentally, and shortly abandoned as unsuccessful (pp. 123, 124).

(3) It was proved moreover, in the present case, as in the Remington-Martin case, that these drainage adjustments were in most cases used under such conditions as to act in a diametrically opposite manner from an Eibel pitch; that is to say, they were used on machines in which the other conditions were such that the stock as it entered upon the wire already had a speed as great as or greater than the wire speed, so that the effect of any pitch on the wire would have been not to *diminish* the difference in speed between the stock and wire (which is the heart and essence of the Eibel invention) but actually to *increase* it, — to cause the stock to *overrun* the wire, and therefore to cause, instead of to eliminate, commotion on the sheet. This was expressly proved in the cases of the Bayless-Austin machines, the Kimberly-Clark machines at Kimberly, the Kimberly-Clark machines at Niagara, the King Paper Company machine and the Northern Paper Company machine, and very likely was the fact in other cases also.

Various witnesses in the present case *claimed* to have known of the Eibel principle prior to Eibel; and so they testified — just as many of them, and just as emphatically, in the Remington-Martin case. But the Court of Appeals for the Second Circuit took the broad admitted facts which we have above suggested, coupled with the facts that until Eibel showed how, no one ever used any pitch sufficient in extent to be of any material use for increasing production, that at the time of Eibel's invention it was the regular practice to run the wires level, and that as soon as Eibel's invention became known his high pitch was instantly adopted by the whole art, as proof that the prior users in fact had no "understanding or appreciation of the Eibel principle", while the Court of Appeals for the First Circuit makes no mention of these circumstances which to the Court of Appeals for the Second Circuit evidently seemed controlling.

THE QUESTION OF INFRINGEMENT IN THE PRESENT CASE IS SUBSTANTIALLY IDENTICAL WITH THAT IN THE REMINGTON-MARTIN CASE.

In the present case the defendant advanced, through its experts, an *argument* as to the *construction of the claims* of the Eibel patent, viz., that the claims should be limited to the use of a pitch sufficient to do away with all drag, which was not advanced in the Remington-Martin case; and by these experts put in evidence figures purporting to show the amount of contribution to stock speed, in feet per minute, produced by the several factors on defendant's machine, head, drag and pitch, which figures were not in evidence in the Remington-Martin case.

To this extent only does the record in the present case differ from the record in the Remington-Martin case on the matter of infringement. *It is not denied that any*

argument for non-infringement in the present case would be equally applicable to the Remington-Martin machines.

The present defendant's machines (there are four of them) have wire pitches of 14 inches (Vol. I, p. 221) and run at paper speeds of about 600 feet per minute (Vol. I, p. 9). In the Remington-Martin case the pitches of the wires of the two machines in issue were, respectively, 18 and 20 inches, and these machines ran at speeds of 550 and 575 feet respectively per minute (Vol. III, p. 120). Both in the Remington-Martin machines and in the defendant's machines in this case the pitch used was at least as great as the pitch depicted on the figure of Eibel's patent, which, as the Court of Appeals in the present case says, is about 14 inches (Vol. I, p. 211).

As we have seen, although the Court of Appeals in the present case apparently inclines to the view that Eibel's claims, properly construed, are limited to the use of such a pitch as will eliminate all drag, it does not expressly so hold. Upon this ground only could the defendant's machines in the present case be held not to infringe, and such a construction would admittedly result in the conclusion not only that the Remington-Martin Company did not infringe, but that no one — not even Eibel himself, had ever used the patent; as the Court of Appeals for the First Circuit says, the patent would then cover "*no useful invention*" (Vol. I, p. 230).

This position as to the meaning of Eibel's claims is, we think, very well dealt with by Judge Hale in his opinion in this case (Vol. I, pp. 189, 190) in the following passage:

> "2. Infringement.— The defendant says that its machines do not infringe the claims of the patent in suit; that Eibel's proposition was to give the wire such an elevation that gravity *alone*, due to the pitch of the wire, would cause the stock to attain the same

speed as the wire at the point where the stock would lose its viscosity and settle down upon the wire in a thin sheet. The defendant urges that it has not given its wire such an elevation, and that, therefore, it does not infringe. In other words, the defendant contends that Eibel's invention contemplated that pitch *alone* should do all the work of bringing the stock from nothing up to an ultimate speed equal to that of the wire; that Eibel contemplated that there should be no 'head' at all back of the slices, and that 'drag' should be done away with altogether, as a factor in accelerating the speed of the stock; and that no machine comes within the Eibel inventive thought unless that part of the stock speed which is contributed by pitch is greater than that part of the stock speed which is due to the other two factors. The learned counsel for defendant urge that when Eibel speaks of a gravity machine, or of a 'gravity-feed', he refers to the use of gravity, to the exclusion of all other elements; and that, when, in his claims, Eibel speaks of the stock traveling by gravity, he refers to the use of gravity without any help from other sources. It is to be noted that Eibel's one object was to arrange a process by which the machine could be run at a much higher speed than heretofore. With this in view, Eibel organized his machines at the Rhinelander Paper Company in such a way that they had a pitch of about fourteen inches and ran at a speed between 500 and 600 feet per minute. To produce this result he used gravity. He used, also, the elements which he found at hand; namely, the 'drag' and the 'head', due to the depth of the 'pond' back of the 'slice'. His effort was to get speed; he did not wish to abolish or disregard any of the elements which helped him to get speed.

"But, if the contention of the defendant is correct, he did not put his own invention into practical use at Rhinelander, or at any other place, for in practice he did not obtain his speed by gravity alone. In fact, the defendant's experts testify that the mode of operation set forth in the Eibel patent in suit has never been put in practical use by anybody; it was not used at Rhinelander; it was not used in the other mills; it is not embodied in the drawings of the patent.

"I cannot sustain such contention. I cannot so construe the specification and claims of the patent. Eibel introduced a new speed-making factor. He proposed to bring the speed of the stock up to the speed of the wire; to use gravity to that end; but I cannot hold that he contemplated that gravity should be used to the exclusion of the other elements which were already in use. He found those elements at work; there is no reason why he should exclude them from helping along the work. The process invented by him begins to operate after the stock has entered upon the wire. His apparent attempt was to get rid of bubbles and wrinkles, before he got to the place on the machine where paper is formed. To do this, he allowed gravity to work with 'drag' and with 'head'. He harnessed all the elements he could find. He brought gravity in with the other elements; and so brought the speed of the stock up to equality with that of the wire. By this means he achieved high speed and also freed the stock on the wire from waves and ripples."

Defendant's No. 2 Machine with the 6-Inch Pitch.

Until after the bill of complaint in this case was filed, defendant's all four machines had always run with a 14-

inch pitch, which is almost identical with that indicated in the drawing of the Eibel patent.

After the bill was filed defendant reduced the pitch on its No. 2 machine from 14 to a little over 6 inches, and the question whether this No. 2 machine is or is not an infringement receives some attention from the Court of Appeals. This 6-inch pitch was not, however, properly before the Court, the only issue being whether what the defendant did prior to the filing of the bill was an infringement or not; and Judge Hale properly refused to rule upon the point at this stage of the case (Vol. I, p. 191).

Defendant reduced the pitch on the machine only for the purposes of this case, the effort being to come just as near as possible to the prior art drainage adjustments and yet to get the benefit in some degree of the Eibel invention. The change was made upon direction of the defendant's counsel (Vol. II, p. 11, X-Qs. 133, 134) "on account of an infringement of the Eibel patent" (Vol. II, p. 9, X-Q. 97), and the instructions to defendant's superintendent Devine were to make the wire flat, but Devine "*didn't want to get up against it that way*" (Vol. II, p. 22, X-Q. 129), and so he left a 6-inch pitch on the machine, evidently as the very minimum at which he could operate and get production comparable to that on the other machines.

This machine as now run with the 6-inch pitch is obviously close to the border-line between infringement and non-infringement. We believe it to be on the infringing side, and, if the question were now pertinent, should so contend, since the pitch is of a different order from any drainage adjustment of the prior art, being twice as great as any such adjustment that was ever successfully used, and since the machine is otherwise operated in accordance with the Eibel principle.

The question as to this machine with the 6-inch pitch is

at present, however, a mere moot question. All the defendant's machines, as organized and operated prior to the filing of the bill, had the 14-inch pitch, which three of them still maintain, and all were, therefore, practically identical with the Remington-Martin machines, so far as infringement of the Eibel patent is concerned.